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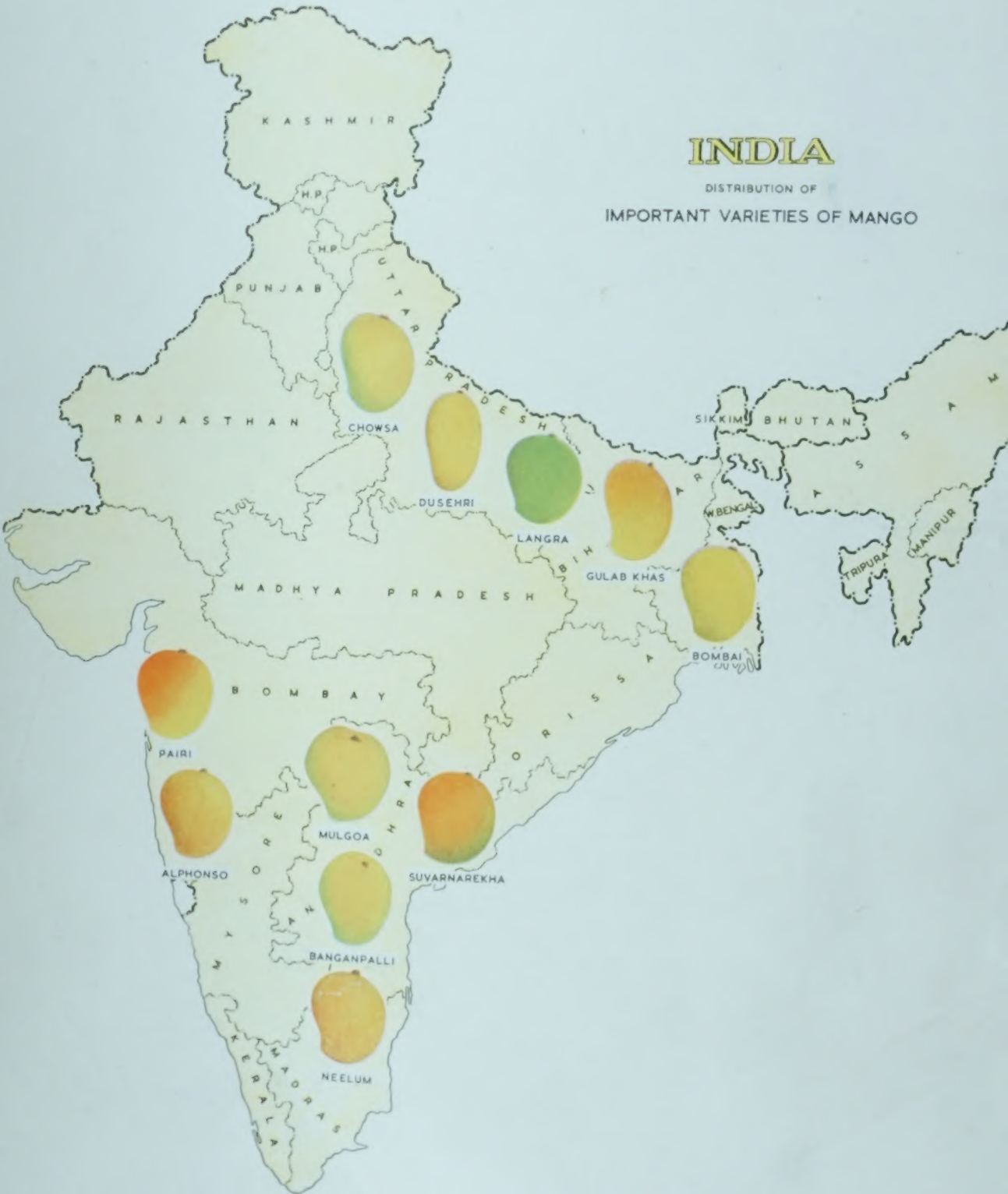




THE MANGO

# INDIA

DISTRIBUTION OF  
IMPORTANT VARIETIES OF MANGO





# THE MANGO

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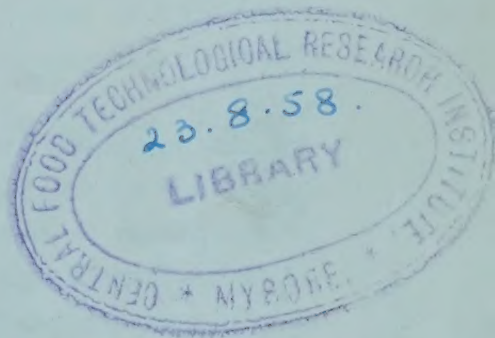
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GOVERNMENT OF INDIA



INDIAN COUNCIL OF AGRICULTURAL RESEARCH  
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Mango

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## FOREWORD

MANGO is the king of Indian fruits. It is easily the most relished and popular among them. On the table of the rich it is a delicacy, and for the poor a food. Large numbers of less fortunate people in the villages during the summer subsist on mango.

During the immemorial ages that this fruit has grown on our soil, large number of varieties have developed. Some connoisseurs put the number of known varieties as 1,400, besides many unknown ones.

When asked about the qualities of mango, Poet Ghalib is reported to have said that it must be sweet and plentiful. It was both good and witty. Perhaps Babar was harsh on mango when he said that mango as a fruit had been over-rated. It is surprising that Europeans in India did not develop sufficient taste for mango. They sometimes called mango the bathroom fruit, but one has to see Jawaharlal Nehru deftly slicing the mango on the banquet table—two pieces apart with stone removed. Ladies with delicate fingers are often seen envying him.

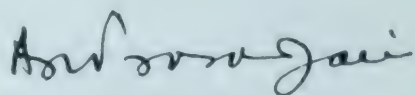
It is a pity that we have not given enough thought to the development and the varietal classification of mango. Connoisseurs of the fruit and the trade have created a confused mass of nomenclature and sometimes the same variety of mango is known by different names in different regions. This, together with careless labelling of the plants in the nurseries, has made the varietal names confusing. I welcome the efforts of the Indian Council of Agricultural Research at a scientific classification of the various varieties so that the research worker, the grower and the tradesman may have a standardised nomenclature and proper description of varieties.

As far back as in 1947, in pursuance of the recommendations of the Twelfth International Horticultural Congress held in Berlin, the Horticultural Workers' Conference in India decided to start action for standardising the names of various fruits grown in India. A scheme for the mango was accordingly taken in hand in 1948. The formulation of description of its different varieties has taken over three years. The data form the foundation of the present monograph. Complete morphological descriptions including vegetative, floral, fruit and stone characters of 210 varieties have been determined, and colour plates of each variety of fruit are given. Wherever available, the brief history of the origin of the variety, the season

## THE MANGO

of flowering and fruiting, the regional home and the various synonyms of the standard name have also been worked out. I think this is a useful study.

This monograph fulfils a long-felt need, and would serve as a book of reference on mango. Yet there are many more varieties of mango which are not covered by the present study, and I hope that the I.C.A.R. will soon extend the scope and make this study fully comprehensive.



MINISTER FOR FOOD AND AGRICULTURE  
GOVERNMENT OF INDIA

New Delhi  
May, 1957



## PREFACE

MANGO is easily the foremost among the fruits of India, commanding as much as 70 per cent of the total area under fruit crops. Its cultivation in this country is ancient and it has intimate place in the life of its people.

The Buddhist pilgrims, Fahein and Sung-Yun, have recorded in their travel notes that a mango grove was presented by Amradarika to Lord Buddha so that he might use it as a resting place. Other important foreign travellers like Huien T'sang and Ibn Batuta, who visited India in the past, also made frequent mention of the mango tree. Archaeological finds have also shown that it had an important place in Indian art. The stupa of Sanchi, which dates back to about 150 B.C., has various sculptured patterns of the tree and the fruit.

Many countries have special trees that have become symbolic of their particular cultures. Thus, the oak in England, the mimosa in Australia, the cherry-blossom in Japan, the date palm in Arabia, and the olive in Italy, have acquired that status. In India, it is the mango, the banyan and the *peepal* that stand out as national trees. The mango, in a sense, is the most significant of these, for it combines utility with beauty and all those endearing qualities which can give to a fruit universal popularity. In the mango season the tree is laden with golden fruits. It has a thick softness of glossy green, and looks as if Nature has created it to serve as the grand symbol of the prolific Indian soil.

The number of mango varieties in India is estimated at over one thousand. In the past, the fruit growers vied with one another in producing the maximum number.

Throughout the long history of its cultivation, countless fancy names have been coined by its lovers to express their admiration for it or to immortalize their own names. This has created a great confusion in the nomenclature of the various varieties. It is necessary, therefore, to attempt a scientific classification so that the grower, the tradesman and the research worker may have a standardized nomenclature and proper description of each variety.

A scheme for the description of important mango varieties grown in the country was initiated by the Indian Council of Agricultural Research in September, 1948. Two hundred and ten of the more important varieties

## THE MANGO

were taken up for study, and extensive data were collected about all the aspects of these. The material has now been compiled for ready reference of scientists as well as of others interested in this important fruit. Since the study was completed before the Reorganisation of States, references in the book to places of origin and distribution of varieties relate to the pre-reorganisation period.

The authors of the monograph, *viz.*, Messrs S. R. Gangolly, Ranjit Singh, S. L. Katyal and Daljit Singh, have done an excellent job, and I compliment them on their labours which have extended over several years. They received valuable guidance from Dr. Sham Singh, Assistant Agricultural Commissioner with the Government of India. Messrs Rajindra Ice and Cold Storage Co., Delhi, provided storage facilities : the Central Photographic Reproduction Section of Air Headquarters, Ministry of Defence, helped in photographic work : and Khan Israr Hussain Khan, Proprietor of Safdar Nursery, Malliahbad and Mr. M. L. Garg, Proprietor of L. R. Brothers, Nursery-men, Saharanpur, made available their valuable variety-collections. Some of the illustrations have been borrowed from the monograph "South India Mangoes" by K. C. Naik and S. R. Gangolly, a publication of the Madras Government.

The monograph has been ably edited by Mr. Prem Nath, Editor, Indian Council of Agricultural Research. Mr. K. K. Pasricha, Artist-cum-Photographer in the Indian Council of Agricultural Research, prepared the colour illustrations. It is hoped that it will prove useful to all those who are interested in mangoes, gardeners as well as connoisseurs.

New Delhi  
June, 1957

M. S. RANDHAWA, D.SC., I.C.S.  
VICE-PRESIDENT  
INDIAN COUNCIL OF AGRICULTURAL RESEARCH

# CONTENTS

	PAGE
FOREWORD ... ..	iii
PREFACE ... ..	v

## PART I

### MANGO VARIETIES

I. MANGO IN INDIA ... ..	3
II. BOTANY OF THE MANGO ... ..	13
III. DESCRIPTION OF VARIETIES ... ..	19

## PART II

### MANGO CULTURE

I. CULTIVATION ✓ ... ..	463
II. INSECT PESTS AND DISEASES ... ..	491
APPENDICES ... ..	503
BIBLIOGRAPHY ... ..	518
INDEX ... ..	527



# LIST OF ILLUSTRATIONS

PLATE		PAGE
	Map of India showing Distribution of Important Varieties of Mango ... ..	<i>Frontispiece</i>
1	Figure of a <i>Yakshi</i> from the Sanchi Stupa with a fruit-laden mango tree in the background ... ..	5
2	<i>Chappar</i> , the Giant Mango Tree near Chandigarh, Punjab ... ..	6
3	Morphology of the Mango ... ..	12
4	Map of India showing Centres of Mango Culture ... ..	18
5-a	Orientation of Leaf ... ..	23
5-b	Shape of Leaf ... ..	23
6-a	Crinkling of Leaf ... ..	24
6-b	Nature of Folding of Leaf ... ..	24
7-a	Nature of Leaf Tip ... ..	26
7-b	Shape of Panicle ... ..	26
8	Parts of the Fruit ... ..	28
9	Forms of the Fruit ... ..	30 & 31
10-a	Forms of the Stalk ... ..	32
10-b	Forms of the Base ... ..	32
11-a	Forms of the Sinus and the Apex ... ..	33
11-b	Forms of the Shoulder ... ..	33
12	Forms of the Cavity ... ..	34
13	Forms of the Beak ... ..	35
14	Abe-Hayat ... ..	39
15	Alipasand ... ..	40
16	Allumpur Baneshan ... ..	43
17	Alphonso Batli ... ..	44
18	Alphonso Bihar ... ..	47
19	Alphonso Black ... ..	48
20	Alphonso Bombay ... ..	51
21	Alphonso Punjab ... ..	52
22	Alphonso White ... ..	55
23	Aman Abbasi ... ..	56
24	Aman Angoori ... ..	59
25	Ambalavi ... ..	60
26	Amin Abdul Ahed Khan ... ..	63
27	Amin Heera ... ..	64
28	Amini ... ..	67
29	Amin Ibrahimpur ... ..	68
30	Amin Khurd ... ..	71
31	Amin Mohammad Yunus Khan ... ..	72
32	Amin Sahai ... ..	75

# THE MANGO

PLATE		PAGE
33	Amin Tehsil	76
34	Amlet	79
35	Anar Mulgoa	80
36	Anokha Sarda	83
37	Anopan	84
38	Anora	87
39	Ashruf-us-Samar	88
40	Asojia	91
41	Athimadhuram	92
42	Aziz Pasand	95
43	Azum-us-Samar	96
44	Bagal Sahai	99
54	Bangalora	100
46	Banganpalli	103
47	Banka	104
48	Bansod	107
49	Baramasia (All the Year Round)	108
50	Begum Pasand	111
51	Belkhas	112
52	Benazir Sandilla	115
53	Badrul Asmar	116
54	Bhaduriya	119
55	Bhawani Chowras	120
56	Bharat Bhog	123
57	Bhopli	124
58	Black Andrews	127
59	Bombai	128
60	Bombai Abdul Huq	131
61	Bombay Bhutto	132
62	Bombay Darsha	135
63	Bombay Green	136
64	Bombay Yellow	139
65	Borsha Kalamsar	140
66	Brindabani	143
67	Buddipasand	144
68	Buddu Ka Kelwa	147
69	Chambatan	148
70	Chandrakaran	151
71	Cherukrasam	152
72	Chinnarasam	155
73	Chota Jehangir	156
74	Cowasji Patel	159
75	Dadamiyo	160
76	Dusehri Aman	163

# LIST OF ILLUSTRATIONS

PLATE	PAGE
77 Dilpasand	164
78 Dondakayalumanu	167
79 Doodia	168
80 Dophool	171
81 Fajri	172
82 Fajri Zafrani	175
83 Fakirwala	176
84 Fakr-us-Samar	179
85 Fazli Malda	180
86 Fazli Zumko	183
87 Fernandin	184
88 George	187
89 Golandas	188
90 Gopal Bhog	191
91 Gopta	192
92 Gulab Jaman	195
93 Gulab Khas	196
94 Hamlet	199
95 Hathijhul	200
96 Himsagar	203
97 Hushnara	204
98 Imam Pasand	207
99 Inayat Pasand	208
100 Jailor	211
101 Jali Bundha	212
102 Jamadar	215
103 Janardhan Pasand	216
104 Jehangir	219
105 Johnson	220
106 Kachmuha	223
107 Kaithki	224
108 Kalapahar	227
109 Kalepad	228
110 Kalipari	231
111 Kancha Mitha	232
112 Kandel	235
113 Karelia	236
114 Karutha Kolamban	239
115 Khangari Bacha	240
116 Khasa Ibrahimpur	243
117 Khas-ul-Khas	244
118 Kheera	247
119 Khudadad	248
120 Khuddus	251



## THE MANGO

PLATE						PAGE
121	Kintalvanipeta	...	...	...	...	252
122	Kishen Bhog	...	...	...	...	255
123	Kohitoor	...	...	...	...	256
124	Kolanka Gova	...	...	...	...	259
125	Kothapalli Kobbari	...	...	...	...	260
126	Kothi Hyderabad	...	...	...	...	263
127	Kumarpahar	...	...	...	...	264
128	Kuanpaharia	...	...	...	...	267
129	Lal Mulgoa	...	...	...	...	268
130	Lal Pairi	...	...	...	...	271
131	Langra	...	...	...	...	272
132	Langra Large	...	...	...	...	275
133	Lashkarshikan	...	...	...	...	276
134	Lata	...	...	...	...	279
135	Lateef Aliwala	...	...	...	...	280
136	Latra	...	...	...	...	283
137	Machli	...	...	...	...	284
138	Malda Handle	...	...	...	...	287
139	Mandragi	...	...	...	...	288
140	Mankurad	...	...	...	...	291
141	Manoranjan	...	...	...	...	292
142	Markeara	...	...	...	...	295
143	Mewa Fajri	...	...	...	...	296
144	Mahmuda	...	...	...	...	299
145	Mohanbhog	...	...	...	...	300
146	Mulgoa	...	...	...	...	303
147	Mundappa	...	...	...	...	304
148	Murshidabad	...	...	...	...	307
149	Mushrad	...	...	...	...	308
150	Nashpati	...	...	...	...	311
151	Nazeem Pasand	...	...	...	...	312
152	Nazuk Pasand	...	...	...	...	315
153	Neelum	...	...	...	...	316
154	Nisar Pasand	...	...	...	...	319
155	Olour	...	...	...	...	320
156	Padiri	...	...	...	...	323
157	Paiposha	...	...	...	...	324
158	Pairi	...	...	...	...	327
159	Panakalu	...	...	...	...	328
160	Panchadarakalasa	...	...	...	...	331
161	Panchavarnam	...	...	...	...	332
162	Panja Pasand	...	...	...	...	335
163	Pansera	...	...	...	...	336
164	Peddakalepadu	...	...	...	...	339

# LIST OF ILLUSTRATIONS

PLATE	PAGE
165 Pedda Neelum	340
166 Pedda Rasam	343
167 Pote	344
168 Pulihora	347
169 Puthi	348
170 Rai Bhog	351
171 Rajapuri	352
172 Rajumanu	355
173 Ram Kela	356
174 Rancee Pasand	359
175 Raspunia	360
176 Rataul	363
177 Reddi Pasand	364
178 Rehmat Khas	367
179 Roos	368
180 Rumani	371
181 Safdar Pasand	372
182 Safeda Calcutta	375
183 Safeda Lucknow	376
184 Safeda Malihabad	379
185 Safeda Sherbati	380
186 Safed Mulgoa	383
187 Sakkar China	384
188 Sakkar Gutli	387
189 Salebhoy Amidi	388
190 Salem Bangalora	391
191 Samarbehisht Alibagh	392
192 Samarbehisht Chowsa	395
193 Samarbehisht Rampur	396
194 Sangtra	399
195 Sardar	400
196 Saunfia	403
197 Sehroli	404
198 Sepiya Shah Pasand	407
199 Shadwala	408
200 Shah Pasand	411
201 Shamsul-Asamar	412
202 Shendriya	415
203 Sindhura	416
204 Sobewali Ting	419
205 Sukh Tara	420
206 Sukul	423
207 Sunderprasad	424
208 Sundersha Hyderabad	427

# THE MANGO

PLATE						PAGE
209	Sundersha Kumta	...	...	...	...	428
210	Surkh Burma	...	...	...	...	431
211	Surkha Panditwala	...	...	...	...	432
212	Suvarnarekha	...	...	...	...	435
213	Swarapadu	...	...	...	...	436
214	Taimuria	...	...	...	...	439
215	Tenneru	...	...	...	...	440
216	Totapuri Kumta	...	...	...	...	443
217	Totapuri Ratnagiri	...	...	...	...	444
218	Totapuri Small Red	...	...	...	...	447
219	Van Raj	...	...	...	...	448
220	Vellai Kolamban	...	...	...	...	451
221	Willard	...	...	...	...	452
222	Yerra Mulgoa	...	...	...	...	455
223	Zafran	...	...	...	...	456
224	Zardalu	...	...	...	...	459
225	Map of India showing Areas of Frost Occurrence	...	...	...	...	464
226	A New Method of Inarching	...	...	...	...	470
227	Air Layering	...	...	...	...	475
278	Map of India showing Commencement of Mango Flowering	...	...	...	...	486





Part I

MANGO VARIETIES





## CHAPTER ONE

### MANGO IN INDIA

THE mango (*Mangifera indica* Linn.) is undoubtedly the most important fruit crop of India. It covers the largest area compared to any other fruit in the country, and thrives in almost all regions except at altitudes above 3,000 feet. From Cape Comorin to the foot of the Himalayas, and from the Punjab to Assam, one can see mango trees flourishing everywhere.

The soil and climate of India are ideally suited to its cultivation. The giant mango tree near village Burail in Chandigarh area of the Punjab is a classic example of the magnitude to which a mango tree can grow. This tree, locally known as *Chappar*, has a trunk 32 feet in girth, with branches 5 to 12 feet in circumference and 70 to 80 feet long. The area over which the crown of the tree spreads is 2,700 sq. yards, and the average yield of fruit is 450 mds. (Randhawa, 1949).

The numerous varieties of mango cultivated in this country provide an unusual diversity of flavours and tastes ; and in many parts the mango serves as a staple article of food for several months in the year. Ripe fruit is also canned in various forms. It is also made into pickles, curries, preserves and *chutneys* of all sorts. Even the stone is not wasted. The kernel is dried, roasted and then eaten. In periods of food scarcity, the kernel is ground into flour and eaten as gruel. Many medicinal properties are also ascribed to mango. The ripe fruit is considered to be invigorating, fattening, diuretic and laxative. The smoke of burning leaves is believed to be efficacious against hiccoughs and several throat troubles. The kernel is given as medicine to persons suffering from asthma and diarrhoea. Baked and sugared pulp of unripe fruit is considered very useful for cholera and plague patients. The gum of the tree and the resinous substance exuded from the stem-end of the fruits are given, mixed with lime juice, in cutaneous affections and scabies. The bark is used in tanning leather, while the timber is utilized in various ways.

#### Origin and History

According to De Candolle (1884), the mango has been cultivated for at least 4,000 years. He is of the view that it is a native of South Asia or

the Malayan Archipelago. Popenoe (1920) also holds similar views about its origin and says: "It seems probable that its native home is to be sought in Eastern India, Assam, Burma or possibly farther in the Malayan region." According to Mukherjee (1951), the genus *Mangifera* probably originated in Burma, Siam, Indo-China, and the Malaya Peninsula; but that the mango itself had its birth in the Assam-Burma region. His view is based on detailed study of the history of the genus, the phytogeographical distribution of allied species, the fossil records, the evidence of numerous wild and cultivated varieties in India, etc. He further refers to the Malayan name of the mango (*mangga*), which closely resembles the Tamil equivalent (*manga*) to show that it did not originate in Malaya. The truly wild mangoes are found in the Chittagong hills and Assam, but not in Malaya. Good cultivated varieties are also not found in Malaya. Vavilov (1926) also thinks that the mango originated in the Indo-Burma region.

The mango has exercised such a spell over the Indian mind through the ages that the high as well as the lowly have employed its name extensively as an attribute of adoration and endearment for the persons and things they loved. It has been variously called *Amra*, *Chuta*, *Rasala*, *Sahakara*, *Atisourabha*, in ancient Sanskrit literature, and the tree has been described as Kalpa-Vriksha, or the wish-granting tree. A king of the name of Amrapala, and a famous courtesan named Amrapali are known in history. The grammarian Panini used the names *Amragupta* for men, and *Amrapura* for towns for illustrative purposes. Plants like *Amra-gandhaka*, *Amra-nisa* (*Curcuma-reclinata*) and *Amra-gandhiharitra*, have been linked with its name to give them status. Even a mountain referred to in *Meghadoot* of Kalidasa bears the name of *Amrakuta*.

The Satapatha Brahmana records the pre-eminence which mango enjoyed in the Vedic age. In Saivist literature, the Linga is sometimes referred to as *Amra-takesvara*; and the Ekamranatha Temple of Kanchi even now testifies to the ancient religious glorification of the mango. The *Amar Kosh* written by Amar Sinha in the Buddhist times contains an immortal eulogy of this king of tropical fruits. In the Ramayana and the Mahabharatha one reads of whole gardens and forests of mango trees; and Valmiki pours out his tender love for mango in peerless verses. Beginning with Kalidasa, many a poet has described the mango blossom as one of the darts of *Manmatha*, the god of love; and even folk-songs sing of the mango tree whose fragrance is a torture to love-lorn hearts. The more





FIGURE OF A YAKSHI FROM THE SANCHI  
STUPA WITH A FRUIT-LADEN MANGO  
TREE IN THE BACKGROUND





'CHAPPAR', THE GIANT MANGO TREE NEAR CHANDIGARH, PUNJAB



ANOTHER VIEW OF 'CHAPPAR'

## MANGO IN INDIA

practical-minded Charaka mentioned it in his famous medico-scientific work, the *Charakasamhita*, as one of the important medicines. Archaeological finds have also shown that it had an important place in Indian art. The stupa of Sanchi, which dates back to about 150 B.C., has various sculptured patterns of the tree and the fruit.

Indian princes used to pride themselves on the possession of exclusive varieties and large mango gardens. Thus, Akbar, the great Mughal Emperor, planted near Darbhanga the Lakh Bagh, a garden of 1,00,000 mango trees. *Ain-e-Akbari* contains a long account of the mango, giving information about the quality and varietal features of the fruit.

(A number of species related to the cultivated mango exist in different parts of the world.) In India apart from the *Mangifera indica* Linn. only one other species is found. This is the *M. sylvatica* Roxb. which grows wild in the North Eastern region of the country. All cultivated varieties and most of the wild mango forests belong to the species *M. indica* Linn. In other countries, such as the Philippines and Indo-China, most of the cultivated varieties are seedling races of the polyembryonic type which breed true to the type. On the other hand, (all varieties) grown in India, except about ten, grown on the Western Coast of India, are monoembryonic. This, combined with the cross pollinated nature of the mango has led to the production of innumerable varieties. Every tree raised from seed is potentially a new variety. (The prehistoric existence of the mango in India, its widespread cultivation all over the country, and the fact that it was propagated by seed for centuries, contributed to the multiplicity of its varieties. The vegetative propagation of mango in India started only 400 years ago and this has helped the preservation of outstanding varieties which originated as chance seedlings.) The total number of varieties existing in India is estimated at over a thousand, and if account be taken of the countless sucking varieties grown in the Punjab and parts of Uttar Pradesh, the number would become very large indeed.

27 mango

### Classification and Nomenclature

The existence of such a large number of varieties in India, and the attempts of many men of means to build the largest collection of varieties so as to outdo their rivals in this respect, has led to the creation of an exceedingly large number of fancy and romantic names. In the matter of coining such names the enthusiasts have overdone the job to the point of eccentricity (Burns and Prayag, 1921).



## THE MANGO

Further, the varieties on introduction from one region of the country to another, have been, deliberately or otherwise, given entirely new names by those importing them. And so, many varieties have come to acquire different names in different parts of the country. This has caused a good deal of confusion in the nomenclature of varieties. For example, the *Totapuri* of Uttar Pradesh, and the *Bangalora* of the South, refer to the same variety as also do the *Suzarnarekha* and *Sandhuriya*. Not only this, the same name is often used for entirely different varieties : the *Malda* in the Calcutta market, for instance, is quite different from the *Malda* of Western Uttar Pradesh ; and the same is true of the many *Safedas* grown in different parts of the country.

The confusion in the nomenclature and the identification of varieties has been further aggravated by the nursery interests. The desire to coin fancy names with a view to attract and allure the customers, has been most pronounced in this sphere. The fancy names given to the varieties ascribe all sorts of imaginary qualities to the fruit. The statement made by Popenoe (1911) that some of the mango varieties catalogued by Indian nurserymen never existed outside their imagination, depicted truly the unreliable character of the nursery trade, which has also caused criticism abroad and has thus discouraged attempts to introduce Indian plants by foreign workers and fruit growers. If foreign markets are to be captured, this situation should be promptly remedied. Of course not all the nurserymen are to blame nor is every mistake a deliberate one. In most cases, the chaos has resulted from the careless handling of plant material in the nursery and wrong labelling. Yet, sometimes the nurserymen in their anxiety to fulfil orders, even of the varieties which are not in stock, resort to misleading labelling. Whatever the reasons, the fact remains that a great chaos exists in the nomenclature of mango varieties. And the buyers of plants after years of careful and laborious nurturing of plants, may sometimes find, to their annoyance, that they have been nourishing something entirely different from what they ordered. The fact that the identification of the varieties by vegetative characters alone at the time of purchase is not possible, and the long time taken by the trees to come into bearing before their identity is established further complicates the situation. It is, therefore, necessary to describe and catalogue the existing varieties, so that the fruit grower is enabled to choose correctly the material suitable for his conditions.

In the improvement of every crop, a stage comes when simple plant



introductions and trials, cease to be of any further value. At this stage, the purely empirical techniques have to be replaced by well planned experiments with definite objectives, and a full knowledge of the plant material available in the country along with its characteristics becomes essential. Without such information, no further progress is possible. Such is the case with the mango today. Mere introduction of varieties from other regions too, is of doubtful value : for varieties thriving in one place usually do not turn out well in another. For example, the varieties *Langra* and *Dusehri* of Uttar Pradesh grown in Madras, show little resemblance to the original parent in respect of flavour, size, and other characteristics. A thorough survey and descriptions of the existing varieties become imperative for further progress and must form the basis of all future work. If we look for a high yielding, disease resistant, choice variety of a regular bearing habit, the chances of coming across a variety possessing all the attributes in nature are remote. We might, however, find varieties with one or more of these characters and then try to combine these through hybridization. And in some cases, we may even have to go to the wild species of *Mangifera* in search of a particular character. Hence, the importance of a thorough knowledge of the characteristics of our existing varieties.

Hedrick (1935) has stressed the importance of systematic study of varieties in breeding work. Not only do we need to study the fruit qualities and yielding abilities of our commercial varieties, we also require information on other specific characters such as the canning quality of a variety, its rootstock potentialities and disease resistance.

The absence of any information regarding even our best varieties is deplorable. It is a pity that so far we do not have any record of the varieties grown in the Lakh Bagh in Bihar, which was started by Emperor Akbar. In other countries a great deal of work on the varieties of their important fruits, such as apples, pears and grapes, has been done. In U.S.A. even a national register of the new varieties coming up is maintained. In this country new mango varieties from the seedling trees are constantly springing up but we are yet a long way off from keeping an up-to-date record of these new varieties. The first necessary step in this direction is to catalogue our existing varieties.

At the Twelfth International Horticultural Congress, held in Berlin in 1938, research workers from all over the world rightly regarded the description and classification of varieties as a fundamental aspect of fruit

## THE MANGO

research and it was resolved that a permanent commission be set up in every country to encourage the undertaking of nomenclature work. This was affirmed at the Horticultural Workers' Conference organised by the Indian Council of Agricultural Research at New Delhi, in 1947.

It is apparent that proper selection of planting material is the *sine qua non* of success in commercial farming. Proper selection is all the more important in the case of fruit growing since the results cannot be perceived until four to ten years after the planting of trees. Owing to the present confused nomenclature of mango varieties, the Indian orchardist is confronted with the perplexing problem of varietal identification and selection. He has no authentic guide for this purpose. The existing chaos will be on the increase unless a rational system of standardization of varietal names and their identification is brought about either by legislation or by increasing the knowledge of varieties among the fruit-growing public. Such work will help the fruit grower in choosing correctly the varieties suitable for his requirements. It will also equip the horticultural research worker with a precise knowledge of the plant material already available, as well as of the source of its availability in the country.

Even though the mango varieties have been well established in India for over 400 years, after the adoption of vegetative methods of propagation, the work of varietal descriptions has been limited and isolated in character. In India all the work done so far has only been of a regional nature. The earliest descriptions of mango using scientific terminology are by Watt (1891). Maries (1901-2) collected about 500 varieties of Indian mango and described them with botanical terminology. The first attempt to suggest the distinguishing characters of varieties was made by Woodhouse (1909a). He described 40 mango varieties of Bihar. Burns and Prayag (1921) described 89 varieties of Bombay Presidency and used similar characters. They grouped these varieties under three cohorts on the basis of the shape of fruit, i.e. round fruited, long fruited and indefinite. They have themselves mentioned that this is an arbitrary classification, and aims only at cataloguing varieties. Popenoe (1932) has described 300 varieties from all parts of the world including India, suggesting some methods of grouping them. Subsequently he classified them into four groups: *Mulgoba*; *Alphonso*; *Sandersshah*; and *Cambodiana*. This was based on fruit characters, colour of the axis and laterals of panicle, pubescence on the panicle branches and the number of embryos per seed. This was the first attempt at including the panicle characters in the descriptions.



## MANGO IN INDIA

The first key for the identification of mango varieties, based upon fruit characters only, was published in 1944 by Sturrock and Wolfe, who described 38 mango varieties from Florida. The descriptions adopted so far had not included the vegetative characters. But, two recent works in India include these also. Mukherjee (1948) has described 72 varieties of Bengal, Bihar and Uttar Pradesh. He has studied the range in the variability of the following characters and has also given a key for the identification of these varieties.

<i>Tree:</i>	Habit.
<i>Leaf:</i>	Colour at emergence ; colour at maturity ; margin ; and size.
<i>Inflorescence:</i>	Colour of panicle branches ; pubescence of panicle branches ; length ; and presence or absence of bracts.
<i>Flower:</i>	Size ; ridges on petals (colour and pattern).
<i>Fruit:</i>	Detailed descriptions.

Simultaneously, Naik and Gangolly (1950) have described 335 varieties of South India. Apart from the fruit characters, they have also laid great stress on the vegetative characters. They found that the apex of the leaf and the inrolling of mature leaf are very important in the identification of varieties. They have classified these varieties into three groups, i.e. fruits roundish, fruits intermediate, and fruits markedly long. These three groups are similar to the groups followed by Mukherjee. They have further divided each of these groups into two cohorts, depending upon whether the fruit had a prominent beak or not.



MORPHOLOGY OF MANGO



## CHAPTER TWO

### BOTANY OF THE MANGO

THE cultivated mango (*Mangifera indica* Linn.) belongs to the natural order 'Anacardiaceae', which yields varnish. Hooker and Jackson (1895) enumerated 65 species under the genus, while Engler and Prantle (1897) have recorded only 32 species. Mukherjee (1949 a) recognises 41 species. In the Malay Archipelago, nine of these species are found. In India, however, only two species are found, *M. indica* Linn. and *M. sylvatica* Roxb. All our cultivated varieties and most of the forests of wild mango varieties belong to the species *M. indica*. The *M. sylvatica* is found to a limited degree, growing wild in the north-eastern part of India only. Its fruit is not edible. Almost all Indian varieties except ten grown on the west coast, are monoembryonic. Usually they are vegetatively propagated by inarching, except the juicy varieties of the Punjab, PEPSU and parts of Western Uttar Pradesh, which are propagated from seed.

The tree is large, spreading, evergreen, with a dense rounded or globular crown. The trunk is erect, thick, without furrows or buttresses, when old. The bark is thick, sometimes with longitudinal bursts containing a little yellowish, transparent gum resin like juice. The young plant has a green epidermis like annual herbs, but as it grows larger, the epidermis is stretched out by the bast. It is now necessary for the plant to form a new protective cover. It forms layers of cork which crack as they thicken and flake off. Under the cork layer is the inner bark called the bast and inside it are concentric layers of wood. The wood is reddish grey, often streaked, moderately hard, coarse grained and soft in young trees and is readily eaten by insects. It is somewhat harder and darker brown on the older trees. The tree has the power of healing the wounds by covering it with a rapid growth of the cork. The wood is often divided scantily with fine rays, wavy and close together.

Branches are very numerous, the lower ones spreading horizontally to a great extent, the upper ones gradually ascending till they become nearly erect in the centre; branchlets are rather thick and robust, often with alternating groups of long and short internodes, terete, glabrous, yellowish green when young, with slightly prominent scars of the fallen leaves.

## THE MANGO

Leaves are simple, alternate, irregularly placed along the branchlets, sometimes remote and at other times (especially at the tips of the flowering branches) crowded, rather long petioled, oblong ovate to oblong lanceolate, base acute to cuneate, narrowed, apex acute to acuminate, entire often with wavy margins, coriaceous, glabrous on both surfaces, leaf blade 10-32 cm. long, 2-9.5 cm. wide with resinous smell when bruised, pinnate nerved, distinctly reticulate veined, costa robust, lateral secondary nerves numerous (12-30 pairs), conspicuous, yellowish green, prominent beneath and in-arching near the margin, alternating with shorter intermediate nerves; young leaves violet (purplish yellow); petiole is terete, slightly thickened or swollen at the base, round, smooth, glabrous; mature leaves dark green.

The inflorescence is a large terminal panicle, almost 6-40 cm. long; rigid, erect or ascending, widely branched, rachis sometimes pink or purple, but often in different shades of green, terete, densely or sparingly tomentose, or thinly pubescent; terminal panicle with somewhat disagreeable flavour, tinged with red and with a little downy pubescence, bracts oval to elliptic, oblong lanceolate or ovate oblong, deciduous with downy pubescence, concave, soon withering and falling off, 0.3-0.5 cm. long; bracteoles ovate and small.

Flowers are small, polygamous, monoecious, yellowish green, deciduous, in dense cymes on the ultimate branchlets, 4-5 merous, nearly sessile, scented, male and bisexual on the same panicle, pedicel terete, short, thick and rigid, densely pubescent, jointed in or above the middle, pink at the base or yellowish green throughout its length, 0.2-0.4 cm. long, 0.5-0.7 cm. when expanded, stipules none.

Sepals 4-5, free, deciduous, shorter than petals, ovate or ovate oblong, rather acute or obtuse, yellowish green or light yellow, concave on both surfaces, but especially on the outside, densely covered with short hairs, ciliate in the upper half segments, imbricate, 0.2-0.3 cms. long, 0.1-0.15 cms. wide.

Petals 4-5, deciduous, spreading, free from the disc or adnate to it, with recurved tips, imbricate, twice the length of the calyx lobes, on the inside having a lobed granular scale or crust, oblong to ovoid to lanceolate, sub-acute, reflexed, thinly pubescent or glabrous, yellowish white with purplish veins at the base of the inner side with 3-5 ochraceous orange coloured ridges often with pink margins, 0.3-0.5 cm. long, 0.12-0.15 cm. wide.

Disc large, fleshy, seated above the base of the petals, distinctly 4-5



## BOTANY OF THE MANGO

lobed, grooved, spongy, citrine, afterwards white as frosted glass, very much broader than the ovary during anthesis, 0.1-0.15 cm. high ; nectary 5, large, yellow, fleshy, surrounding the base of the germ forming an excavated 5 lobed receptacle.

Stamens 4-5, very unequal, 1 or 2 of them longer and fertile, the rest reduced to sterile or abortive staminodes, inserted inside or on the disc, slender tipped with a small gland. Besides these, there are generally 2-3 more minute sterile filament like bodies issuing from the apices of the lobes of the nectary ; staminodes minute, purple or yellowish white, hardly 0.1 cm. long ; perfect stamens 0.2-0.3 cms. long, filaments white or yellowish white, terete, glabrous, violet, sterile, 0.1 cm. long, male flowers without a rudimentary ovary ; stamens central, closely embraced by the lobes of the disc.

Ovary in the bisexual flowers conspicuous, globose, glabrous, citrine or yellowish white, 0.1-0.15 cms. in diameter, sessile, one-celled, usually obliquely ovoid ; style lateral, curved upwards, glabrous, citrine or yellowish white, 0.15-0.2 cms. long ; stigma simple, small and terminal ; ovule solitary, one-celled, usually pendulous from the basal or lateral or sub-basal funicle.

Drupe fleshy, resinous, very variable in respect of shape and dimensions, yellowish green or yellow to reddish when ripe, fruit size 4-25 cm. long and 1.5-10 cm. wide, very unequalised, ovoid oblong, obliquely oblong, pyriform, sub-ovoid, rounded or obtuse, peel rather thick, coriaceous, flesh yellow or orange coloured, juicy, savoury ; stone solitary, rather thick, woody, with fibrous outer layer containing one flat seed. Seed large, ovoid oblong, compressed, testa thin, papery, cotyledons plano-convex, often unequal and lobed, radicle slightly curved upwards (vide Plate No. I.).

## CYTOGENETICS

Very limited work has been done on the cytogenetics of mango so far. The only major work is by Mukherjee (1950b) and the following account is based primarily on that.

Maheshwari (1934) reported the number of chromosomes in *M. indica* as  $n=24$  to 26. Roy (1939) reported it as  $n=6$  to 8 and Darlington and Janaki Ammal (1945) reported  $2n=40$ . Mukherjee worked with three species, *M. indica*, *M. sylvatica* and *M. caloneura*, grown in Burma, and 24 Indian varieties. He confirmed the chromosome number to be  $2n=40$ .

## THE MANGO

However, the varieties *Latra*, *Safdar Pasand*, and *Kalapahar* showed aberrations with regard to the number of somatic chromosomes which varied from 40 to 42. Mature pollen grains from 13 other species were also studied, and showed similar morphology. They were elliptic in shape, and had closely pitted exine with three long tapering and sharply defined furrows; and each grain had a large germ pore at the centre. The average diameter was also identical, ranging from 24 to 30  $\mu$ . This suggests that in other species of *Mangifera* also the number of chromosomes should not be different. The chromosome number is stable and no polyploid series of chromosomes were found. The total number of satellites and secondary constrictions in the chromosome complements of different species and varieties vary between eight and sixteen, with the size of the chromosomes ranging from 0.4 to 2.0  $\mu$ . A large number of chromosomes have no apparent constriction in each complement. On the basis of morphology, the chromosomes have been distinguished into eleven types, of which eight are distinct and three intergrading. Analysis of karyotype shows that the varieties and allied species differ from one another mainly on account of different assortment of these chromosome types. The number of nucleoli in a somatic cell varies between eight and sixteen, and corresponds generally with the number of satellited and secondary constricted chromosomes. The nucleoli in each nucleus have definite size differences i.e. big, intermediate and small, and they form homomorphic pairs in the two nuclei in a dyad cell indicating the homologous nature of the varieties. The varieties *Alphonso* and *Dusehri* have exactly identical chromosomes. In *M. sylvatica* a large number of chromosomes (30) are of the short type. The morphological classification of mango varieties on the basis of fruit shape does not show any significant correlation with groupings according to nucleolar chromosome number.

During meiosis, the chromosomes show regular pairing into 20 bivalents and subsequent regular disjunction. No multivalents have been seen and no other meiotic irregularity, such as the formation of chromosomal bridges or lagging, have been found. At metaphase, the bivalents show a maximum secondary association into eight units. This suggests eight as the basic number for *Mangifera*. It is also supported by the eight distinct chromosome types. The presence of  $2n=20$  and  $2n=30$  in the allied genera *Rhus* and *Semecarpus* respectively suggests that there may be two basic numbers in *Anacardiaceae* or that eight for *Mangifera* might have been derived from five or multiple of five.



## BOTANY OF THE MANGO

Mukherjee (1951) has observed that the fact that no polyploid series have been found in *Mangifera*, the high number of chromosomes, and a corresponding high number of the nucleolar chromosomes, indicates the polyploid nature of the mango. It appears that the primitive type or types which gave rise to the mango varieties originated through allopolyploidy, most probably through amphidiploidy. The morphology of the varieties shows gradual continuous change, as is expected in a polyploid. Phenotypic and genotypic characters both show continuous changes. The differentiation of numerous varieties took place primarily through genemutations—the selected varieties being perpetuated by vegetative propagation. The varieties being compatible, intervarietal crossing has probably been another important factor in the production of new varieties.



## CHAPTER THREE

### DESCRIPTION OF VARIETIES

THE total number of distinct varieties cultivated in India has been variously estimated at 500 to 1,000. If the number of seedling trees being grown, each of which is a separate variety, is added to this, the number will become exceedingly large. However, most of these varieties do not have any real merit or commercial value. The present study includes all the important varieties, numbering 210, which are grown in the country.

The number of varieties studied in each important mango region are listed below :

<i>State</i>	<i>Centre</i>	<i>Number of varieties studied</i>
Uttar Pradesh	(a) Maliahabad	31
	(b) Saharanpur	28
Bombay	(a) Ratnagiri	10
	(b) Poona	20
	(c) Baroda Farm	6
Madras and Andhra	Kodur, Salem & Visakhapatnam	55
Hyderabad	Hyderabad & Sangareddy	11
Bihar	Sabour	20
West Bengal	Krishnagar & Murshidabad	18
	Gurdaspur, Panipat & Karnal	10
Orissa	Cuttack	1
	Total	210

## THE MANGO

Enquiries made from Vindya Pradesh, Madhya Pradesh, Madhya Bharat, Rajasthan and Surashtra showed that the commercial mango varieties of these states are common with the varieties of the neighbouring areas; and so the study of mango varieties in these states was not undertaken. In Assam, too, no survey was conducted; for the state is comparatively of little importance in respect of the culture of the mango or the wealth of varieties; and the distance difficulties are formidable.

Hedrick (1935) has stated that it is seldom possible for any taxonomist to observe all the varieties in one place and the research workers are, therefore, obliged to depend upon descriptions, illustrations, or herbarium specimens, in compiling such work, as it is impossible for any one to form permanently in mind a true picture of the characteristics of each of the multitude of varieties cultivated. He adds that it is essential that the descriptions should be as accurate and as comprehensive as possible. According to him insufficient characterization formed the chief defect of our systematic work on fruit crops. He also pointed out that descriptions could be accurate and yet unreliable due to the omission of important features or the inclusion of too many unimportant facts. Consequently, the true picture is obscured. Therefore, it is not necessary to describe every aspect of the plant: the outstanding features alone need be brought out. When all the characters are recorded, greater stress must be given on the more important ones.

It has been pointed out by previous workers engaged in the description of mango varieties that qualitative characters are much more constant and important than the quantitative characters. For example, the shape of fruit of a given variety is fairly constant, showing little response to changing environment, as compared to the size of the fruit. Similarly, the up curling of the leaf or its shape is much more constant and dependable than the size of the leaf. The work of Naik and Gangolly (1950) has shown that of all the leaf characters, leaf tip and folding of the leaf are most important, with the shape of the leaf and colour of the emerging leaves ranking next in importance. Among the floral characters, these workers have found that shape of the inflorescence is the only character which is dependable. Among the fruit characters, they found the shape of the fruit including the presence or absence of the beak as the most important. The nature and distribution of the fibre and the nature of the veins in the stone were also found to be varietal characteristics.



## DESCRIPTION OF VARIETIES

The descriptive terminology and the methods of selection of specimens employed by Naik and Gangolly (1950) were adopted in the present study. The relevant portions from their work are reproduced in the following pages for ready reference.

### **Selection of Specimens**

After selecting the typical tree in normal growth and health and of adult bearing age of each variety and in each representative region, the selection of material from such trees was undertaken for detailed examination. The selection of shoots and leaves was made from only the current season's growth which had completed growth for the season. All growth in the interior of the tree which may possess abnormal features was deemed unsuitable. Out of the uninjured current season's shoots from the exposed region of the trees, a dozen were selected at random from each tree by careful inspection of all sides. The selection was limited to the non-flowering shoots.

The selection of the inflorescence and flowers for study was limited only to the terminal panicles of typical representative shoots from all over the exposed regions of the tree. Axillary panicles, those found in a cluster or mixed panicles, were not taken for study. Similarly the terminal panicles which were too vigorous or stunted or malformed, and those which were produced prematurely or too late in the season were also left out.

For recording fruit descriptions, a dozen typical fruits were selected at random from all exposed sides of the tree. Out of these only one was ultimately selected for final detailed description. To record description of the colour, flavour and taste it was necessary to include only such fruits that had attained full maturity on the tree itself. An efficient working basis for the determination of optimum maturity of the material was found to be roughly the distinct appearance of dots on the skin, the minimum exudation of latex in most varieties at the time of picking and the occurrence of characteristic full sound when the fruits were tapped.

The shape of the tree is intimately connected with the pose of the leaf and, therefore, accurate description of the leaves is essential for a complete study.

The description of the height is expressed in horticultural literature mainly in a relative manner, employing such terms as tall, medium and dwarf. While these terms may enhance the value of varietal description,

## THE MANGO

their value in classification of varieties may not be high, unless accompanied by quantitative data, which were accordingly collected (Appendix II).

The tree form has been called oval when the tree spread is very much smaller than the height, round when height and spread are almost equal and dome shaped when spread is more marked than the height.

When the pose of the leaf, the angle made by the leaf with the shoot is less than 45 degrees, the leaves are designated as upheld or erect. On the other hand, when the angle is a right angle or wider, the leaves are termed as drooping or down held. The intermediate position entitles the leaves to be termed as spreading or out-held (Plate 5).

On par with the pose of the leaf is the leaf shape, which is quite a distinct varietal character in mango and furnishes one of the most conspicuous and the simplest diagnostic characters for use by practical growers and nurserymen. When the leaves are very narrow and lance shaped, they are designated elliptic lanceolate. When the maximum breadth of the leaf is found at the centre of the leaf along with the lance shape they are termed as oval lanceolate. Ovate lanceolate is the term applied when the lance shaped leaves have their maximum breadth nearer to the leaf base (Plate 5).

Crinkled leaves form the characteristic features of some varieties, while twisting of the leaves is prominently observed in others. Wavy margin is a varietal character, which also deserves special attention (Plate 6).

The reflection of the leaf or the curving of the leaf backwards on the mid-rib is found to be very marked in some varieties, while it is totally absent in others. The extent of reflexion is denoted by applying such relative expressions as slightly reflexed or strongly reflexed.

The nature of folding of the leaf is another feature of considerable diagnostic value. In some varieties the leaves are flat and in others the blades are curved upwards in varying degrees. In the latter case, the leaves are termed as slightly folded or strongly folded according to the extent of the curvature (Plate 6).

While the importance of all the above mentioned leaf characters would be obvious, none of these outweigh in importance the characters and nature of the leaf tip which has been employed by a number of pomologists as a basis for classification. Leaf tip in mango may be sharp pointed with a long drawn tip (acuminate) and may end in a blunt point (acute)

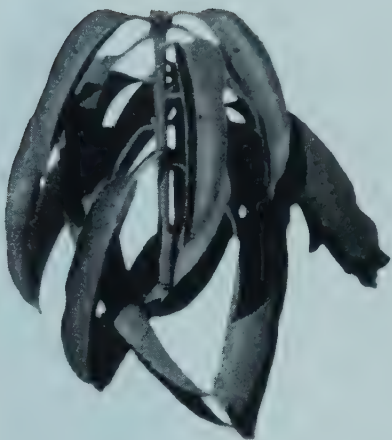




*Upheld or erect*



*Intermediate*



*Out-held or spreading*

5a—ORIENTATION OF LEAF



*Ovate Lanceolate*



*Oval Lanceolate*



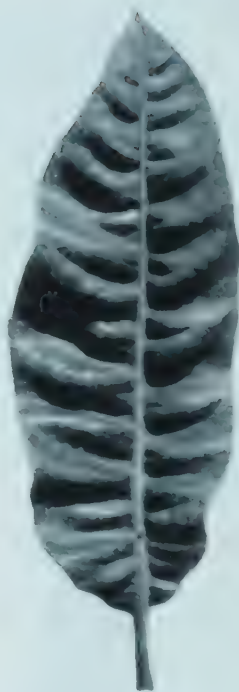
*Elliptic Lanceolate*

5b—SHAPE OF LEAF

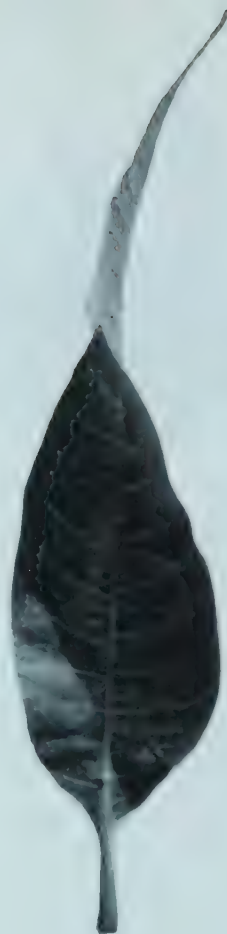




*Wavy*

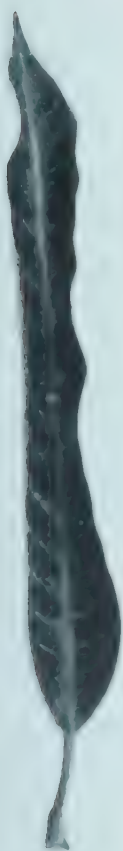


*Crinkled*



*Twisted*

6a—CRINKLING OF LEAF



*Strongly Folded*



*Slightly Folded*



*Flat*

6b—NATURE OF FOLDING OF LEAF

## DESCRIPTION OF VARIETIES

or be intermediate between the above extremes (sub-acuminate) (Plate 7).

Colour of the emerging leaves is a more constant character not subject to variation under the diverse conditions of mango culture. The colour shades are of varying degrees in the same plant at different stages of development of the leaf. This fact necessitates the description at frequent intervals in the growing season, which is very short. Practical difficulties in arranging frequent visits to all mango growing centres also hampered the collection of complete descriptions. Fortunately in most varieties and trees, immature leaves in various stages of development are found almost always. This fact facilitated the collection of data to the necessary extent.

The nature and thickness of the leader shoots was also found to furnish a useful character for mango varietal studies. In some varieties, the leader shoots are very thin or willowy, in others very thick, and yet in others intermediate between the two extremes.

### Floral Characters

Shape of the panicle represented one of the most important varietal characteristics (Plate 7). Conical panicles with the length of the main axis markedly greater than the spread is a definite character in some varieties. In others, pyramidal inflorescence with the spread approximating the length forms the distinguishing feature. Size of the panicles is another easily distinguishable character especially if exact dimensions accompany the descriptions. In the present studies, measurements of length of the axis and the spread of the panicle are taken to serve an index of the panicle size.

Hairiness of the panicle has been found to be of considerable diagnostic importance in mango as in most other fruits. To express the varying degrees of hairiness in the mango, the terms found to be adequate were, glabrate or sparsely puberulent, moderately puberulent and densely puberulent.

With the aid of the standard colour dictionary the colour of the inflorescence assumes an importance of real practical value ; but if the colour descriptions are based on individual judgment and if sufficient care is not exercised in selecting typical panicles from exposed regions of the tree, the colour descriptions will be shorn of all value.

The development of staminodes appears to be a character of sufficient



*Obtuse*

*Acute*

*Sub-acuminate*

*Acuminate*

7a — NATURE OF LEAF TIP



*Conical*

*Pyramidal*

*Broadly Pyramidal*

7b — SHAPE OF PANICLE



## DESCRIPTION OF VARIETIES

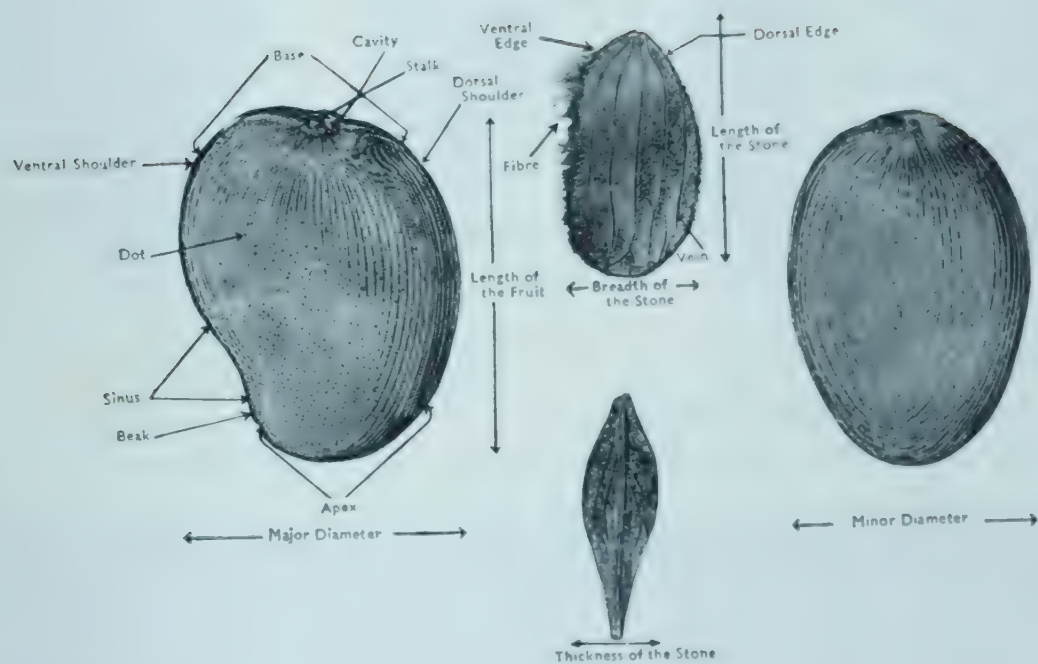
importance even from a casual study of some varieties. Only two groups are deemed sufficient to bring out the varietal differences, *viz.*, well developed and poorly developed staminodes.

The above descriptions require to be accompanied by descriptions of relative development of stamens and pistil. Mango varieties differ markedly in regard to the relative size of the stamens and pistil and their orientation on the flower disc. In some, the stamen is longer than the pistil, in others, the pistil and stamens are equal, and yet in others, the pistil will be longer than the stamens. The relative position of the stamens and pistil may be parallel or oblique to each other.

### Fruit Characters

It seems appropriate to adopt the following conventional methods of recording fruit descriptions (Plate 8). The fruit is held in its normal position, *i.e.* as it would be while hanging on the tree. The observer faces the fruit in such a way to have the beak and concave surfaces to his left and the convex surface to his right. The stalk end is called the base and the opposite end, the apex. The left lobe which is generally larger in most varieties is designated as the left or the ventral shoulder and the opposite one as the right or the dorsal shoulder. The size and the nature of the stalk which attaches the fruit to the tree as well as the nature of insertion of the stalk to the fruit are given some prominence. The depression that is often present near the point of attachment of the stalk of the fruit is commonly termed as the cavity. The concavity which lies a little above the beak or 'Nak' is known as the sinus. The distance from the point of attachment to the extremity at the distal end is termed as the length of the fruit. The maximum distance between the two shoulders is recorded as the major diameter. The minor diameter is obtained by placing the fruit flat on a smooth surface in the natural position and measuring the depth from the surface on which the fruit rests to the highest point on the fruit.

The form of the fruit (Plate 9) possibly affords the most prominent varietal character and has accordingly been employed largely in the mango classification in the past. Except in sub-normal or malformed fruits, this character seems to be the most valuable under the various diverse environmental conditions. Symmetrical fruits are those which can be divided into two equal halves so as to have the shoulders almost equal and well balanced. When such an imaginary cut is not



PARTS OF THE FRUIT

## DESCRIPTION OF VARIETIES

possible, the fruit is styled as asymmetrical. Another group is also met with in which the shoulders are of very unbalanced shape with one markedly higher than the other. The fruits of this group are classed as oblique shaped. The commonest fruit shapes in mango are roundish, ovate, oval, oblong, cordate, reniform, peento etc., with a number of shapes intermediate between these. In Plate 9 are given the usual combinations of shapes which have been found in the course of the present investigation.

The size of the mango is undoubtedly only of relative importance and can only be of practical value if accompanied by accurate data on dimensions, weights, etc. which have therefore been collected and recorded in these studies in Appendix II at the end.

There are mainly two types of stalk insertion in mango. The term square is applied when the stalk insertion is in almost vertical plane with the axis of the fruit (Plate 10).

Some sort of fleshy protuberance near the insertion of the stalk forming an extension of the base is found in fruits of certain varieties and this requires to be included in any complete description.

The basal end of the mango is rounded, slightly flattened, obliquely flattened, necked or obliquely rounded. In order to avoid voluminous descriptions, the various shapes are illustrated in Plate 10.

In a similar manner the common shapes of the apex sinus and end met with in mango are illustrated in Plate 11.

The shoulders differ markedly as regards their size. If they are unequal, mention has to be made as to which of these two shoulders is broader and more prominent. It is also possible to come across varieties wherein one or both the shoulders are absent. Irrespective of their size, the shoulders may be level or one higher than the other. The various shapes of the shoulders met with are illustrated in Plate 11.

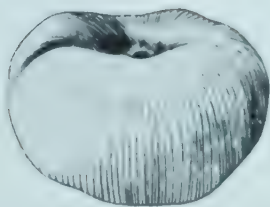
The cavity is absent in some varieties, slight in others or deep in still others (Plate 12).

The size, shape and prominence of the beak are easily noticeable characteristic features in mango. While it is missing or absent in some varieties, in others it may end in a point, be slight but distinct, slightly prominent, prominent, mammiform, beaked or may be straight, hooked or curved (Plate 13).

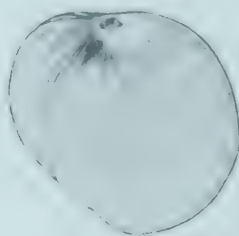
Colour of the fruit with all the various shades and tints affords a useful distinguishing character and is the most difficult for accurate des-



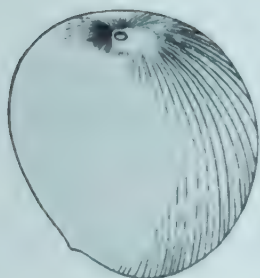
FORMS OF THE FRUIT



*Peento*



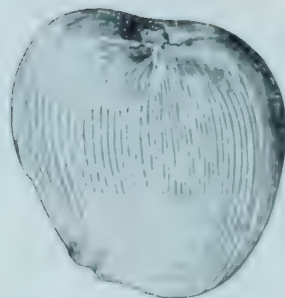
*Cordate*



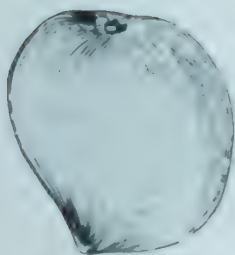
*Roundish*



*Roundish Oblique*



*Ovate Roundish*



*Ovate*



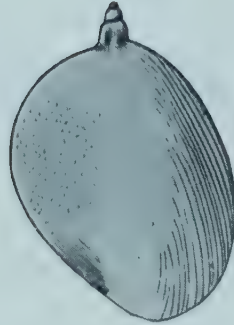
*Ovate Oblique*



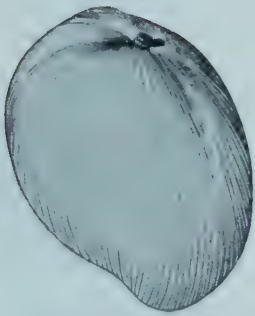
*Ovate Reniform*



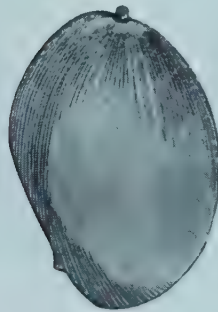
*Ovate Oblong*



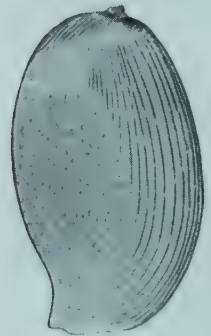
*Oval*



*Obliquely Oval*



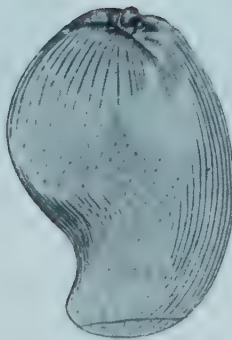
*Oblong Oval*



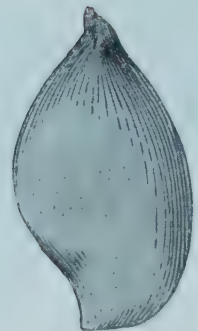
*Oblong*



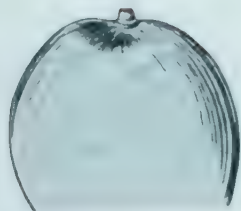
*Oblong Oblique*



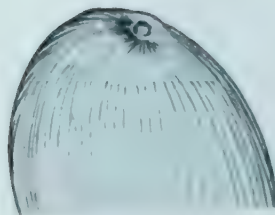
*Oblong Reniform*



*Oblong Elliptic*

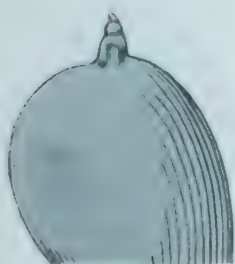


*Square*



*Oblique*

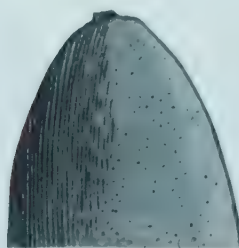
10a—FORMS OF STALK



*Extended*



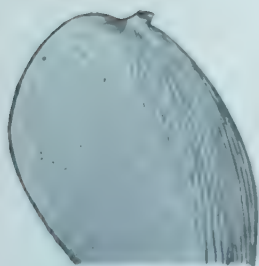
*Necked*



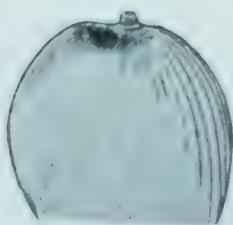
*Tapering*



*Rounded*



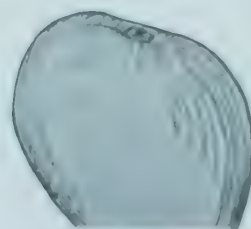
*Obliquely Rounded*



*Slightly Flattened*



*Flattened*



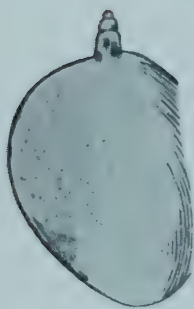
*Obliquely Flattened*

10b—FORMS OF BASE



SINUS

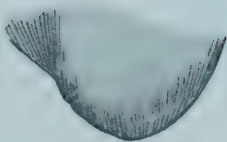
APEX



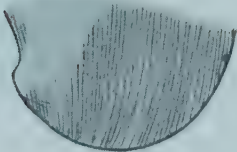
*Absent*



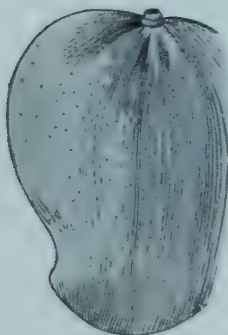
*Slight*



*Broadly Pointed*



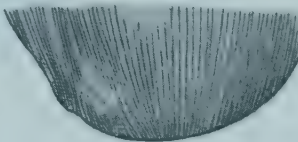
*Rounded*



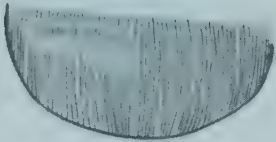
*Shallow*



*Deep*

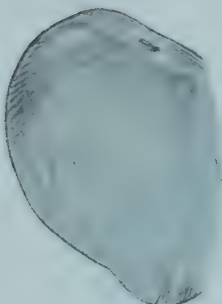


*Broadly Rounded*

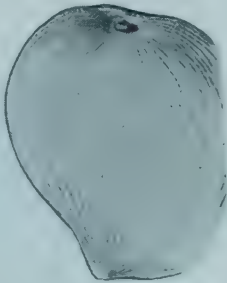


*Flattened*

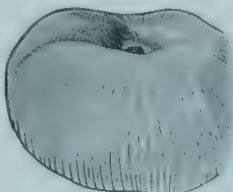
11a—FORMS OF SINUS AND APEX



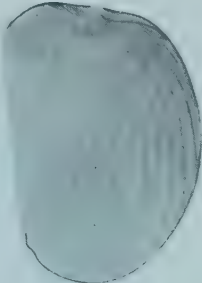
*Rising and then Rounded*



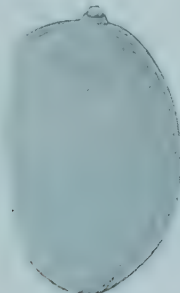
*Rounded*



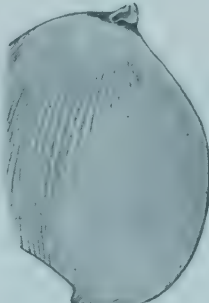
*Broadly Rounded*



*Ending in a Moderate Curve*



*Ending in a Long Curve*

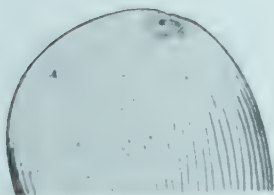


*Sloping*

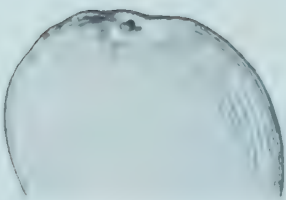


*Falling Abruptly*

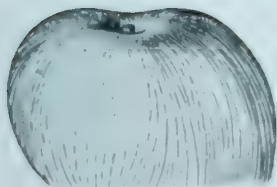
11b—FORMS OF SHOULDER



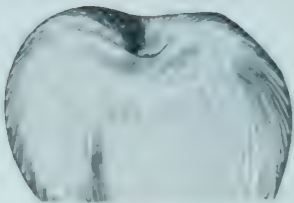
*Absent*



*Slight*

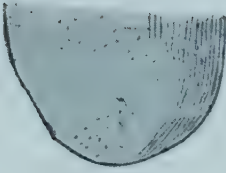


*Shallow*

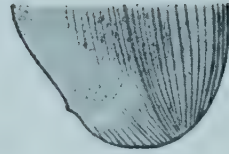


*Deep*

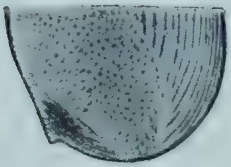
FORMS OF CAVITY



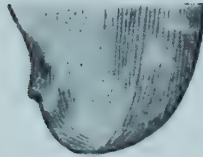
*Absent*



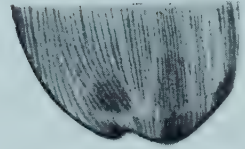
*A Point*



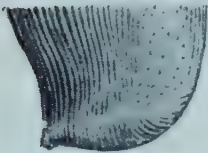
*Slight but Distinct*



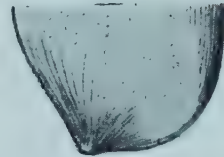
*Slightly Prominent*



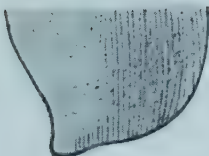
*Prominent*



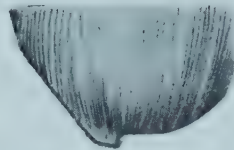
*Mammiform*



*Broadly Mammiform*



*Curved*



*Hooked*



## THE MANGO

cription. A large part of the confusion that now exists is believed to have been caused by the differing standards employed in the past.

In the description of various colour characters, colour dictionary by Mearz and Paul has been employed in the present study. By colour is meant only the ground colour of the fruit skin and not the dots or the blush. The latter when present on the cheeks or shoulders has been described separately.

The lenticels popularly known in horticultural parlance as dots, are usually subcutaneous. They vary in size between varieties as also in the manner of distribution. In regard to the former, only such relative terms as small, medium and large and with regards to the latter, close, moderately distant or distant are deemed sufficient to bring out the prominent varietal differences.

Similar relative terminology is employed while describing the thickness of the skin. With regard to the nature of the skin, however, it is found necessary to apply such terms as membranous, leathery or tough and tenacious to feel.

Texture of the flesh, its aroma, juiciness and taste are some of the important fruit characters which cannot possibly be missed, but in all of which the terminology has necessarily been rather inexact for lack of any accurate standard.

The presence or absence of fibre, the texture and the size of the fibre are also found to be important characters, but here also the descriptions have to be necessarily couched at present in relative terms.

To describe the flesh, terms like buttery, meaty, soft and firm are considered to be adequate provided they are accompanied by relative but sufficiently expressive terms indicative of the flavour as pleasant, aromatic, acid, sub-acid, delightful and piquant. The practical value of all these fruit quality descriptions will be enhanced if the above descriptions are completed by general estimates from a number of independent observations and this procedure was adopted whenever possible. The use of such terms as poor, fair, medium, good, very good and best are deemed to be all that can be drawn in to render the estimation of quality sufficiently intelligible.

As in the case of the fruit, the form, size and shape of the seed or stone need to be carefully and completely specified. These are required to be accompanied by weights and dimensions. The texture and position of the fibre seem to afford also some useful information for varietal identification. In some varieties the fibres are confined only to the ventral edge

## DESCRIPTION OF VARIETIES

of the seed and do not extend far into the flesh, while in others they are spread all over. Some varieties are characterised by the existence of a few fibres on the ventral edge and short fibre all over the rest of the surface. The fibres may be coarse, stiff or soft. They may be sparse, abundant or intermediate. The veins on the stone, their prominence and their course are too important to be left out. They are usually parallel or forked and may either be slightly raised or slightly depressed, and are rarely either grooved or prominently ridged.

## THE MANGO

### ABE-HAYAT

The variety has good taste and flavour. It is a choice bearing one. The history of its origin is not known.

*Tree* : Medium, vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky ; shoots medium thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, slightly folded ; margins wavy ; venation moderately prominent ; tip acute ; base rounded to acute ; emerging leaves pyrite yellow, growing leaves bistre green turning grass green.

*Inflorescence* : Medium to large, conical, pyrite yellow, moderately puberulent ; stamens larger than and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate oblong ; base obliquely rounded to obliquely flattened ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak slight but prominent ; sinus slight ; apex rounded to slightly flattened ; skin thin to medium thick, smooth, golden yellow ; dots medium and distant, flush with the surface ; flesh soft to moderately firm, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oval-oblong ; fibrous, fibres medium soft, covered all over and medium on the ventral edge ; veins parallel and forked and slightly depressed.

*Fruit quality* : Good ; bearing from mid to late season ; moderately resistant to winds and hoppers ; keeping and peeling qualities moderate.





ABE-HAYAT



ALIPASAND

## DESCRIPTION OF VARIETIES

### ALIPASAND

The variety is indigenous to certain districts of Madras State. Little is known about its origin. The fruit is of a mediocre quality, and does not warrant extension of distribution. The only special features of this variety are its capacity to produce two crops annually and good storage life.

*Tree* : Small to medium, moderately vigorous to slow growing, upright to spreading, medium productive and uncertain bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, strongly folded ; margins entire ; venation prominent ; tip subacuminate ; base acute ; emerging leaves orange citrine, immature leaves claret brown turning emerald green.

*Inflorescence* : Large, conical, cource green, densely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong reniform ; base rounded ; stalk inserted squarely ; cavity absent ; ventral shoulder equal and level with the dorsal, and rounded, dorsal shoulder ending in a long to moderate curve ; beak mammiform ; sinus deep ; apex broadly pointed ; skin medium thick, smooth to fairly rough, leathery, primuline yellow ; dots medium and close, flush with the surface ; flesh firm, primuline yellow, slightly fibrous ; fibres sparse, medium and coarse ; flavour mildly pleasant ; taste medium sweet ; juice scanty.

*Stone* : Oblong reniform ; covered with sparse, soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Medium to poor : bearing twice a year, late and off season ; fairly resistant to winds and hoppers ; keeping-quality fair to medium.



## THE MANGO

### ALLUMPUR BANESHAN

The history of the origin and distribution of this variety is uncertain. It is indigenous to certain districts of Andhra State.

It is believed that this variety probably owes its origin to some superior chance-seedling in Allumpur village in the Kurnool district of Andhra State. It was first propagated from a grafted mango tree by the Fruit Research Station, Kodur, from the orchard of late Sri P. V. Chungal Reddy and planted in the variety-collection plot at that station. In recent years, this station has formed the principal centre of dissemination of this variety. It represents one of the best quality varieties of the Indian mango and is, therefore, gaining popularity in most districts of Andhra and Madras States. It is, especially valued by those who attach more importance to the high quality of the fruit than to the heavy crop-propensities of certain other varieties. It closely resembles *Imampasand*, both in respect of the fruit and the characteristics of the tree.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium to thin ; shoots slender.

*Leaves* : Small to medium, erect, slightly reflexed on the mid-rib, elliptic lanceolate, flat ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves medal bronze ; immature growing leaves pansy purple turning orange cinnamon.

*Inflorescence* : Medium, pyramidal, empire yellow, densely puberulent ; stamens equal and parallel to the pistil ; staminodes well developed.

*Fruit* : Large, obliquely oblong to oblong oval ; base obliquely flattened ; stalk inserted obliquely ; cavity slight ; ventral shoulder broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal, shoulder sloping ; beak slight but distinct ; sinus slight ; apex rounded to broadly pointed ; skin thin, primuline yellow ; dots small, close, flush with the surface ; flesh firm, fibreless, maize yellow ; flavour excellent ; taste very sweet ; juice abundant.

*Stone* : Oblong ; covered with short and soft fibre all over ; veins forked and prominently raised.

*Fruit quality* : Very good ; bearing poor to medium, mid-season ; fairly resistant to winds andoppers ; keeping-quality good.



ALLUMPUR BANESHAN



ALPHONSO BATLI



## DESCRIPTION OF VARIETIES

### ALPHONSO BATLI

The variety was selected for study from the Government Fruit Experiment Station, Kirkee, Poona. The history of the origin and dispersion of this variety is not known. It possesses good fruit qualities and fair commercial importance, and deserves to be introduced into other mango growing regions.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top oval ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, elliptic lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves of isabella colour ; immature growing leaves cinnamon brown turning buffy citrine.

*Inflorescence* : Medium, pyramidal, absinthe green, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong to oblong-oblique ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight ; apex broadly pointed to rounded ; skin thin, smooth, deep chrome ; dots small and distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour pleasant ; taste sweet ; juice moderate to abundant.

*Stone* : Medium, oblong sub-reniform ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing heavy, mid-season ; moderately resistant to hoppers and winds ; keeping-quality poor to medium.

## THE MANGO

### ALPHONSO BIHAR

As the name implies, the variety is indigenous to Bihar. The history of its origin and distribution is uncertain. It is believed that it originated as a superior chance-seedling from the *Alphonso* variety of Bombay, which it resembles in many respects. Owing to its heavy-bearing tendencies, it has gained fair commercial importance in Bihar.

*Tree* : Large, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk stocky to medium ; shoots medium to thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins tend to be twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves yellowish citrine ; immature growing leaves ecru olive turning rainette green.

*Inflorescence* : Medium, conical, lime green, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Small to medium, ovate oblique ; base slightly to obliquely flattened ; stalk inserted squarely ; cavity absent ; shoulders equal, ventral slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak absent to a point ; apex broadly pointed . skin thin, smooth, deep chrome ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over ; veins parallel, slightly to prominently raised.

*Fruit quality* : Good ; bearing heavy, mid-season ; moderately resistant to winds and hoppers ; keeping-quality good, peeling-quality medium.



ALPHONSO BIHAR





ALPHONSO BLACK

## DESCRIPTION OF VARIETIES

### ALPHONSO BLACK

(The variety was selected for study from Ratnagiri in Bombay State. It is totally different from the variety of the same name cultivated in the North Kanara district in Bombay State. It possesses medium fruit qualities and, therefore, does not deserve wider popularisation.)

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded to dome shaped ; trunk medium ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip sub-acuminate to acuminate ; base rounded ; emerging leaves citrine, immature growing leaves of isabella colour.

*Inflorescence* : Medium, pyramidal, coral red, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, ovate oblong ; base obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders equal, ventral slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate to long curve ; beak absent or just a point ; sinus slight ; apex rounded ; skin medium thick, smooth cadmium yellow ; dots medium, close, flush with the surface ; flesh firm, fibreless, capucine yellow ; flavour pleasant ; taste moderate to sweet ; juice moderately abundant.

*Stone* : Medium, oval ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.

## THE MANGO

### ALPHONSO BOMBAY

This is the leading commercial variety of Bombay State, and one of the best in the country. Owing to the many desirable qualities it possesses, it has spread to almost all the districts of the States of Madras, Bombay, Hyderabad and Travancore-Cochin. The variety is particularly suited to humid districts on the west coast of the Indian Peninsula. In the drier regions it has not been found to flourish very well as it does in the coastal districts. The variety is known by different names in different mango growing tracts. In Mysore State it is known as *Badami*. In the central districts of Madras State, especially Salem and Coimbatore it is called *Gundu*. In the Tinnevelley district of the Madras State it is known as *Patnam Jathi* and in Madras as *Khader*. In the South Kanara district and the Konkan tract of Bombay State it is popularly known as *Appas*, which in some cases is mutilated as *Haphus* or *Kagdi Happus* (*Kagdi* because of the thin skin of the fruit).)

*Tree* : Medium to large, vigorous, upright, productive, regular to alternate bearing ; top oval to vase form ; trunk medium ; shoots medium thick.

*Leaves* : Medium to large, spreading, strongly reflexed on the mid-rib, oval lanceolate, crinkled, slightly folded ; margins entire, twisted ; venation moderate to prominent ; tip acuminate ; base acute ; emerging leaves of isabella colour ; immature growing leaves cinnamon brown, turning buffy citrine.

*Inflorescence* : Large, broadly pyramidal, prussian red, moderately puberulent ; stamens shorter than pistil and parallel to it ; staminodes well developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity absent or slight ; ventral shoulder broader and higher than dorsal, ventral shoulder rising and rounded, dorsal shoulder ending in a moderate curve ; beak absent or just a point ; sinus slight ; apex rounded ; skin medium thick, capucine yellow ; dots medium, moderately distant ; flesh firm, fibreless, capucine yellow ; flavour delightful ; taste very sweet ; juice moderate to abundant.

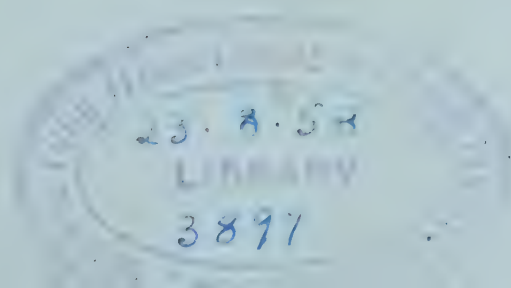
*Stone* : Oblong oval ; covered with short and coarse to stiff fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Excellent ; bearing medium to heavy, mid-season ; moderately resistant to hoppers and winds ; keeping-quality good. It has also been found good for canning purposes.





ALPHONSO BOMBAY





ALPHONSO PUNJAB

## DESCRIPTION OF VARIETIES

### ALPHONSO PUNJAB

The variety is indigenous to the East Punjab. The history of its origin and spread is not known. It is thriving well in the Punjab. The fruit possesses good qualities and is a very desirable variety to be planted in any commercial garden. This variety resembles to a great extent the Bombay *Alphonso* variety in respect of fruit characteristics while it is totally different in regard to the tree and flower characters. It was studied at the Agricultural Farm, Karnal, Punjab.)

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire to wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves ecru olive ; immature growing leaves ecru green turning citrine.

*Inflorescence* : Medium, conical, absinthe green, sparsely puberulent ; stamens unequal, smaller than and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak a point or missing ; sinus absent ; apex broadly pointed ; skin medium to thick, smooth, golden glow ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, light cadmium ; flavour pleasant ; taste very sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oblong to oblong oval ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly to prominently raised.

*Fruit quality* : Good ; bearing heavy, mid-season ; moderately resistant to winds and hoppers ; keeping-quality good ; peeling-quality medium.



## THE MANGO

### ALPHONSO WHITE

The variety is indigenous to North Kanara district of Bombay State. The history of its origin and spread is not known. It derives its name from the sap green or light green colour of the fruit when mature, in comparison with the dark green colour of the *Alphonso Black*. It is also known under the name of *Bili Ishada* in Kanara district of Bombay State. The variety possesses mediocre qualities and does not require wider popularisation.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky ; shoots thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat, inclined to be crinkled ; margins tending to be twisted ; venation prominent ; tip acute ; base rounded ; emerging leaves deep chrysolite green ; immature growing leaves mignonette green turning buffy citrine.

*Inflorescence* : Medium, pyramidal, saccardos umber ; sparsely puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium to large, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity shallow to deep ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long to moderate curve ; beak slightly prominent ; sinus absent ; apex rounded ; skin medium thick, smooth to inclined to be warty, capucine yellow ; dots small and close, flush with the surface ; flesh firm to soft, fibreless, mustard yellow ; flavour pleasant ; taste moderate to sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oval ; covered with fairly dense and short fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping-quality poor to medium ; peeling-quality medium.



ALPHONSO WHITE



AMIAN ABBASI



## DESCRIPTION OF VARIETIES

### AMAN ABBASI

The history of origin and spread of this variety is not known with certainty. It is believed to have had its origin in Uttar Pradesh. It derives its name from 'Aman', meaning long, and 'Abbasi', probably after the name of the person who first propagated it. It is believed to have originated as a chance-seedling in the garden of Rais Abbas Ali of Sandilla in Hardoi district of Uttar Pradesh.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves ecru olive, immature growing leaves citrine.

*Inflorescence* : Medium, pyramidal, absinthe green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, oblong oblique ; base obliquely flattened to rounded ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus absent or slight ; apex rounded ; skin thin, smooth, golden glow ; dots medium to large, distant, flush with the surface ; flesh firm, fibreless, empire yellow ; flavour pleasant to delightful ; taste sweet ; juice moderately abundant.

*Stone* : Medium to large, oblong ; covered all over with dense, short and soft fibre ; veins parallel and slightly raised.

*Fruit quality* : Good ; bearing medium, mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.

## AMAN ANGOORI

The variety originated as a chance-seedling in the orchards of Inaiki Amin Khan, landlord of Sahabad in Hardoi district of Uttar Pradesh from where it has spread to the neighbouring mango growing regions in Bihar. It derives its name from 'Aman', meaning long and 'Angoori', derived from the colour of the fruit which is similar to that of grape. The fruit is of mediocre quality and does not deserve further popularisation.

*Tree* : Small to medium, moderately vigorous to slow growing, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender to medium thick.

*Leaves* : Small to medium, spreading, slightly reflexed on the midrib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acuminate ; base round to acute ; emerging leaves cinnamon brown, immature growing leaves deep chrysolite green.

*Inflorescence* : Medium, conical, course green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong ; base obliquely rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus shallow ; apex rounded ; skin medium-thick to thick, golden glow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, lemon chrome ; flavour mildly pleasant ; taste medium to sweet ; juice moderately abundant.

*Stone* : Large, oblong ; covered with dense, short and soft fibre all over ; veins forked, slightly to prominently raised.

*Fruit quality* : Medium ; bearing medium, mid-season ; moderately resistant to hoppers and winds ; keeping-quality good ; peeling-quality medium.



AMAN ANGOORI





AMBALAVI

## DESCRIPTION OF VARIETIES

### AMBALAVI

The variety was studied from the mango collection block at the Government Fruit Research Station, Kodur, Andhra State. It is a late variety possessing mediocre qualities. Its history of origin is not known.

*Tree* : Medium, vigorous, spreading, regular bearing ; top rounded ; trunk stocky ; shoot slender.

*Leaves* : Medium to large, drooping, slightly reflexed on the mid-rib, ovate lanceolate, flat or slightly folded ; margins entire or wavy ; venation moderately prominent ; tip acute ; base acute ; emerging leaves chrome lemon, immature growing leaves corinthian red, turning russett green.

*Inflorescence* : Large, pyramidal, chrysolite green, sparsely puberulent ; stamens larger than pistil and lying oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong ; base tapering to slight-necked ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder sloping and then rounded, dorsal shoulder ending in a long curve ; beak a point ; apex rounded ; skin thin, smooth and at times tending to be warty, primuline yellow ; dots small and moderately distant, flush with the surface ; flesh firm to soft, moderately fibrous, deep chrome ; flavour piquant ; taste sour to moderately sweet ; juice moderately abundant.

*Stone* : Medium to large, oblong ; moderately fibrous, fibres medium to coarse, medium all over and large on the ventral edge ; veins parallel, forked and grooved.

*Fruit quality* : Medium, bearing late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.

## AMIN ABDUL AHED KHAN

The name 'Abdul Ahed Khan' is after that of the person in whose garden this variety is believed to have originated first. It is known under other names also, e.g. *Kohinoor* and *Dandiwali Amin*. The name *Kohinoor* appears to have been derived from the special qualities of its fruit. *Dandiwali* means 'of the ridge', for the mothertree of this variety is said to have originated on a ridge (*Dandi*), and '*Amin*' means long fruit.

*Tree* : Large, vigorous, upright to spreading, productive, regular bearing ; top rounded to vase form ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves viridine green, immature growing leaves martius yellow turning absinthe green.

*Inflorescence* : Medium, pyramidal, cource green, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong oval ; base rounded to obliquely rounded ; stalk inserted squarely ; cavity absent or slight ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder slightly rising and then rounded, dorsal shoulder ending in a long curve ; beak distinct to slightly prominent ; sinus absent ; apex broadly pointed to rounded ; skin thick, rough, forsythia ; dots medium, moderately distant, submerged ; flesh firm, fibreless, mustard yellow ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Medium to large, oblong ; covered with dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing medium to heavy, mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities good.





AMIN ABDUL AHED KHAN



AMIN HEERA

## DESCRIPTION OF VARIETIES

### AMIN HEERA

The variety is from Fatehpur district of Uttar Pradesh. It is believed to have originated as a chance-seedling and later spread to many parts of the Indo-Gangetic plain. The history of its origin and distribution is not known. It appears to derive its name from *Amin* meaning long, and *Heera*, meaning jewel, thus implying that it is a jewel among the fruits. There is also another version of the origin of its name, according to which the mother tree is believed to have been found first in the garden of a lady named 'Heera'.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging and immature growing leaves absinth green turning buffy citrine.

*Inflorescence* : Medium to large, conical, corymbose green, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium to large, oblong sub-reniform ; base rounded ; stalk inserted obliquely ; cavity absent ; shoulders unequal and level, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak a point to distinct ; sinus slight to shallow ; apex rounded ; skin medium thick, smooth, primuline yellow ; dots medium, moderately distant, submerged ; flesh firm, fibreless, apricot yellow ; flavour pleasant to delightful ; taste sweet ; juice moderately abundant.

*Stone* : Large, oblong ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Very good ; bearing mid to late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



## THE MANGO

### AMINI

The variety is suited for culinary purposes, especially for preparation of pickles and *chutneys*. The history of its origin and distribution is not known. The variety has been studied from Government Fruit Experiment Station, Kirkee, Poona, from where it has been introduced to the Government Central Farm, Ollukara, Trirchur, in Cochin State. It does not possess any other special features which would demand its wider cultivation.

*Tree* : Medium, moderately vigorous to slow growing, upright to spreading, unproductive to medium-productive, regular bearing ; top rounded ; trunk medium ; shoots thick.

*Leaves* : Large, spreading to drooping, moderately to strongly reflexed on the mid-rib, oval lanceolate, strongly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base obtuse ; emerging leaves mignonette green, immature growing leaves verona brown turning rainette green.

*Inflorescence* : Large, conical, rose dore, densely puberulent ; stamens shorter than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Large, broadly oval ; base slightly flattened ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak absent or just a point ; sinus slight ; apex rounded ; skin medium thick, smooth to roughened, sunflower ; dots medium, distant, flush with the surface ; flesh soft, moderately fibrous, cadmium yellow ; flavour acid ; taste sour ; juice moderately abundant.

*Stone* : Large, oblong ; covered with medium soft fibre all over ; veins forked and prominently raised.

*Fruit quality* : Poor as a desert fruit, but good for culinary use . bearing mid to late season ; highly susceptible to hoppers and winds . keeping-quality poor ; peeling-quality medium.



AMINI



AMIN IBRAHIMPUR

## DESCRIPTION OF VARIETIES

### AMIN IBRAHIMPUR

The variety derives its name from *Amin*, meaning long (fruit) and *Ibrahimpur*, the name of the village in Maliahabad tehsil of Lucknow district in Uttar Pradesh where the variety has originated. In recent years it has been gradually spreading in other neighbouring districts of Uttar Pradesh also.

*Tree* : Medium, moderately vigorous, spreading, productive, with alternate bearing tendency ; top rounded ; trunk medium to slender : shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire to wavy ; venation moderate to abundant ; tip sub-acuminate ; base rounded ; emerging leaves citrine, immature growing leaves buffy citrine.

*Inflorescence* : Medium, conical, lumier green, sparsely puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Large, oblong ; base slightly flattened to rounded ; stalk inserted squarely ; cavity slight to shallow ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent or a point ; sinus slight to shallow ; apex broadly pointed ; skin thick, rough, primuline yellow ; dots small, distant, flush with the surface ; flesh firm, fibreless, empire yellow ; flavour pleasant to delightful ; taste sweet to very sweet ; juice scanty to moderately abundant.

*Stone* : Medium to large, oblong ; covered with dense, short and soft fibre all over ; veins parallel and slightly depressed.

*Fruit quality* : Very good ; bearing early ; moderately resistant to winds and hoppers ; keeping-quality medium ; peeling-quality good.



## THE MANGO

### AMIN KHURD

The variety derives its name from *Amin*, meaning long, and *Khurd* meaning junior. It is reported to have originated as chance-seedling in 'Buland Bagh' belonging to Buland Khan of Malihabad from where this variety has spread to most of the areas in the neighbourhood of Uttar Pradesh.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing : top rounded : trunk medium : shoots medium, thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat : margins wavy and inclined to be twisted : venation moderately prominent : tip acuminate : base acute : emerging and immature growing leaves dresden brown.

*Inflorescence* : Medium, conical, raw umber, moderately puberulent : stamens equal and oblique to pistil, staminodes well developed.

*Fruit* : Medium, oblong to oblong oblique : base obliquely rounded : stalk inserted obliquely : cavity absent : shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve : beak distinct : sinus slight to shallow : apex rounded to broadly pointed : skin thick, smooth, primuline yellow : dots medium, moderately distant, flush with the surface : flesh firm, fibreless, mikado orange : flavour pleasant : taste sweet : juice moderately abundant.

*Stone* : Medium, oblong to oblong sub-reniform : covered all over with sparse, short and soft fibre : veins forked and slightly depressed to grooved.

*Fruit quality* : Very good : bearing heavy, mid-season : moderately resistant to hoppers and winds : keeping and peeling qualities good.



AMIN KHURD



AMIN MOHAMMAD YUNUS KHAN

## DESCRIPTION OF VARIETIES

### AMIN MOHAMMAD YUNUS KHAN

The variety is named after Mohammad Yunus Khan in Malihabad, where the mother tree is still growing near a well. It is a choice bearing variety with fairly good qualities.

*Tree* : Medium, moderately vigorous, spreading, medium productive, alternate bearing ; top rounded ; trunk slender ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval-lanceolate, flat and inclined to be slightly folded ; margins entire and tending to be wavy ; venation moderately prominent ; tip ; base acute ; emerging and immature leaves palm green turning grape fruit colour.

*Inflorescence* : Medium, conical, corinthian red, moderately pubescent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oval oblique ; base obliquely flattened ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral higher than dorsal, ventral shoulder rounded to ending in a moderate curve, dorsal shoulder ending in a moderate curve ; beak absent or slight ; sinus shallow ; apex rounded to slightly flattened ; skin moderately thick, smooth, pyrethrum yellow ; dots moderate and distant, flush with the surface ; flesh moderately firm, fibreless, brass coloured ; flavour pleasant ; taste sweet ; juice fairly abundant.

*Stone* : Medium, oblong, fibrous ; fibres medium, soft and covered all over and medium on the ventral edge ; veins parallel and forked and slightly raised.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping-quality good ; peeling-quality medium.



## THE MANGO

### AMIN SAHAI

The variety originated from a chance-seedling mango tree propagated by Sahai, a *mali* in Malihabad in Uttar Pradesh. The name is derived from the combination of words *Amin*, meaning long (fruit), and 'Sahai' the name of the *mali*. A few grafts of this variety were first presented by Sahai to the Safdar Nursery at Malihabad which has formed the chief source of its spread in recent years. The variety deserves to be planted in every garden as it is suited both as a choice bearing and as a commercial variety.

*Tree* : Small to medium, moderately vigorous, upright to spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins tending to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves ecru olive, immature growing leaves buffy citrine.

*Inflorescence* : Medium, conical, corinthian red, moderately pubescent ; stamens unequal, smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium, oblong ; base rounded ; stalk inserted squarely to obliquely ; cavity absent ; shoulders unequal, ventral broader than dorsal, and ending in a long curve, dorsal shoulder ending in a long curve to sloping ; beak absent ; sinus absent ; apex rounded ; skin medium thick, smooth, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, apricot yellow ; flavour pleasant to delightful ; taste very sweet ; juice scanty to moderately abundant.

*Stone* : Large, oblong ; covered with fairly dense, short and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Very good ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



AMIN SAHAI



AMIN TEHSIL.

## DESCRIPTION OF VARIETIES

### AMIN TEHSIL

The variety is reported to have originated as a superior chance-seedling in the compound of the tehsil headquarters at Malihabad from where it was first propagated and spread to other parts of Uttar Pradesh. As the fruit of this variety is very attractive, it is also known as *Prince*.

*Tree* : Medium, moderately vigorous, spreading, very productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, oval lanceolate, flat ; margins entire, inclined to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves orange citrine, immature growing leaves cinnamon brown turning orange citrine.

*Inflorescence* : Large, conical, light corinthian red, moderately pubescent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak distinct ; sinus slight ; apex rounded ; skin medium thick, smooth, golden glow ; dots small, close, flush with the surface ; flesh firm, fibreless, empire yellow ; flavour delightful ; taste sweet ; juice moderately abundant.

*Stone* : Medium to large, oblong ; covered with fairly dense soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : From very good to best ; bearing heavy and early ; moderately resistant to hoppers and winds ; keeping-quality medium to good ; peeling-quality good.



## THE MANGO

### AMLET

The variety is cultivated in the Salem district of Madras State. The history of its origin and spread is not known. It is sometimes known as *Hamlet*. In the Kurnool district of the Andhra State it is popularly known as *Manoranjani*. As the name implies, the fruit is very attractive with a flush of bright red colour on the shoulders against a bright background of orange yellow colour of the skin.)

*Tree* : Large, moderately vigorous, spreading, medium productive, regular bearing ; top dome shaped ; trunk stocky to medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly to strongly reflexed on the mid-rib, oval lanceolate, slightly to strongly folded ; margins entire ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves of isabella colour, immature growing leaves medal bronze turning olive lake.

*Inflorescence* : Medium, conical, yellowish oil green, densely pubescent ; stamens shorter than pistil and parallel to it ; staminodes poorly developed.

*Fruit* : Large, ovate reniform ; base slightly flattened, stalk inserted squarely ; cavity slight ; ventral shoulder equal and level with dorsal and rounded, dorsal shoulder ending in a moderate curve ; beak prominent ; sinus shallow ; apex broadly pointed ; skin medium thick, primuline yellow with a blush of corinthian red on shoulders ; dots small, moderately distant, slightly submerged ; flesh soft, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice abundant.

*Stone* : Oblong ; covered with medium soft fibre all over ; veins slightly to prominently raised and forked.

*Fruit quality* : Medium to good ; bearing medium to poor, mid-season ; fairly resistant to winds and hoppers ; keeping-quality medium.



AMLET



ANAR MULGOA

## DESCRIPTION OF VARIETIES

### ANAR MULGOA

The variety is from Hyderabad (Deccan). The history of its origin and distribution is not known. It is a very high class variety and deserves to be popularised for planting in cottage gardens.

*Tree* : Small, slow growing, spreading, medium productive, regular to uncertain bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Small, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves olive ochre, immature growing leaves buffy olive turning ochraceous buff.

*Inflorescence* : Medium, pyramidal, lettuce green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong ; base rounded ; stalk inserted squarely, cavity absent ; shoulders equal and level, ventral shoulder ending in a long curve, dorsal slopping to ending in a long curve ; beak absent ; sinus slight to shallow ; apex rounded ; skin thick, rough and inclined to be warty and russet green ; dots medium and close, submerged ; flesh firm, fibreless, mustard yellow ; flavour pleasant to delightful ; taste very sweet ; juice scanty.

*Stone* : Medium, oblong ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : From very good to best ; bearing mid to late season ; moderately resistant to hoppers and winds ; keeping-quality good ; peeling-quality medium.



## THE MANGO

### ANOKHA SARDA

The variety derives its name from 'Anokha' meaning marvellous and 'Sarda', a type of melon. It is reported to have originated as a superior chance-seedling in Kaliashpur village near Saharanpur in Uttar Pradesh. Khan Bahadur Naeem Khan, who was the landlord of Kailashpur village, is reported to have planted the first graft of this variety near a manger. So originally it came to be known as 'Khorwala' meaning the tree from the manger. The mother tree is said to have attracted the attention of Kurban Ali Khan, the proprietor of Henbane Nursery, Saharanpur, who found it unusually different from other mango trees, being huge in size and bearing large fruits. He named the variety *Anokha Sarda* and planted it in his nursery which has formed the chief source of distribution of this variety in recent years.

*Tree* : Medium, moderately vigorous, spreading, medium productive, alternate bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Large, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins wavy ; venation moderately prominent ; tip acute ; base acute ; emerging leaves prout's brown and immature growing leaves cinnamon brown turning prout's brown.

*Inflorescence* : Medium, conical, brick red, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Large, ovate oblong to oblong, sub-reniform ; base slightly flattened ; stalk inserted obliquely ; cavity absent to slight ; shoulders unequal, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak distinct to slightly prominent ; sinus shallow ; apex rounded ; skin medium thick, smooth to rough, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh soft, fibreless, cadmium yellow ; flavour pleasant with slight traces of turpentine ; taste sweet ; juice moderately abundant.

*Stone* : Large, oblong sub-reniform ; covered with fairly dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to hoppers and fairly resistant to winds ; keeping-quality medium ; peeling-quality poor.



ANOKHA SARDA



ANOPAN

## DESCRIPTION OF VARIETIES

### ANOPAN

The variety is said to have been introduced in Uttar Pradesh from Rais Mirza Bagan in Murshidabad in West Bengal. The history of its origin and spread is, however, known not with definiteness. It is a good commercial variety and deserves to be popularised.

*Tree* : Medium, moderately vigorous, upright, very productive, alternate bearing ; top vase form ; trunk slender to medium ; shoots slender.

*Leaves* : Small to medium, erect, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins inclined to be wavy ; venation obscure ; tip sub-acuminate ; base acute ; emerging leaves deep chrysolite green.

*Inflorescence* : Small, conical, lettuce green, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium, ovate ; base slightly flattened ; stalk inserted squarely ; cavity absent ; shoulders equal, level, ventral and dorsal shoulders rounded ; beak absent ; sinus absent ; apex rounded ; skin medium thick to thick, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, sparingly fibrous, picric yellow ; flavour pleasant ; taste sweet ; juice moderate to abundant.

*Stone* : Medium, oblong oval ; covered with dense, short and soft fibre all over and medium fibre on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing heavy, mid-season ; moderately resistant to hoppers and highly resistant to winds ; keeping-quality medium ; peeling-quality good.



## THE MANGO

### ANORA

The history of origin and distribution of this variety is uncertain. It appears to have originated as a chance-seedling in Magsoo Ali Khan's garden in Kailashpur near Saharanpur in Uttar Pradesh.

This variety does not possess good fruit qualities and therefore does not deserve any special efforts for further popularisation. Its only attractive feature is the large size of its fruit.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded, inclined to be crinkled ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves dresden brown and immature growing leaves verona brown.

*Inflorescence* : Medium, conical, primuline yellow, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium to large, oblong sub-reniform ; base obliquely rounded ; stalk inserted obliquely ; cavity absent ; shoulders unequal, level, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder sloping ; beak distinct to slightly prominent ; sinus shallow ; apex rounded ; skin medium to thick, smooth to rough, lettuce green ; dots small, moderately distant, flush with the surface ; flesh firm, sparingly fibrous, primuline yellow ; flavour pleasant ; taste moderately sweet ; juice moderate to abundant.

*Stone* : Large, oblong ; covered with fairly dense, short to medium soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Poor ; bearing medium, mid-season ; moderately resistant to winds ; keeping and peeling qualities poor.



ANORA



ASHIRUF-US-SAMAR

## DESCRIPTION OF VARIETIES

### ASHRUF-US-SAMAR

This variety is from Hyderabad (Deccan). The history of its origin and spread is not known. The fruit possesses good keeping-quality and has, therefore, become popular.

*Tree* : Small, moderately vigorous, spreading, medium productive, regular bearing : top rounded : trunk medium : shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat : margins inclined to be wavy : venation moderate to prominent : tip acute : base acute, emerging leaves dresden brown and immature growing leaves cinnamon brown.

*Inflorescence* : Small to medium, conical, towny olive, moderately puberulent : stamens equal and parallel to pistil : staminodes poorly developed.

*Fruit* : Medium, roundish to ovate roundish : base rounded : stalk inserted squarely : cavity absent : shoulders unequal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve : beak slight but distinct : sinus absent to slight : apex rounded : skin thick, smooth, primuline yellow : dots small and close, flush with the surface : flesh firm, fibreless, maize yellow : flavour pleasant to delightful : taste sweet : juice scant.

*Stone* : Medium, oblong oval : covered with short, dense and soft fibre all over and medium on the ventral edge : veins forked and slightly raised.

*Fruit quality* : Medium to good : bearing mid-season : fairly resistant to hoppers and winds : keeping-quality good : peeling-quality medium.



## THE MANGO

### ASOJIA

The variety derives its name from 'Asu', the name of a month of the Hindu calendar corresponding to August-September, and 'Jia' meaning fruition. As the fruit matures very late in the season, it is named accordingly. The history of its origin is not known. Its cultivation is restricted to Uttar Pradesh.

*Tree* : Medium, moderately vigorous, productive, regular bearing ; top rounded to dome shaped ; trunk medium to slender ; shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves lime green and immature growing leaves yellowish citrine turning chrysolite green.

*Inflorescence* : Medium, pyramidal, ethuscan red, moderately pubescent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong oval ; base rounded and slightly extended ; stalk inserted squarely ; cavity absent ; shoulders unequal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight ; apex rounded ; skin medium thick, smooth, cosse green, dots medium, moderately distant, submerged ; flesh firm to soft, fibreless, empire yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong oval ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium, bearing heavy and late season ; moderately resistant to hoppers and winds ; keeping-quality good ; peeling-quality medium.



ASOJIA



ATHIMADHURAM

## DESCRIPTION OF VARIETIES

### ATHIMADHURAM

The variety is grown in certain districts of Andhra State. The history of its origin and spread is not known. The variety has gained a fair measure of popularity on account of the good quality of its fruit which is very sweet. This is a very desirable variety to be planted in cottage gardens.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, elliptic, lanceolate, flat ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves cadmium orange and immature growing leaves vandyke red turning buffy citrine.

*Inflorescence* : Medium, pyramidal, corinthian red, moderately puberulent ; stamens unequal, smaller than pistil and parallel to it ; staminodes poorly developed.

*Fruit* : Medium, roundish ; base slightly flattened ; stalk inserted squarely ; cavity shallow ; shoulders equal, level, sometimes ventral higher than dorsal, both shoulders rounded ; beak absent ; sinus slight to shallow ; apex rounded ; skin medium thick, rough to warty, ta-ming, dots small, close, submerged ; flesh firm, sparingly fibrous, light salmon orange ; flavour pleasant ; taste very sweet ; juice moderately abundant.

*Stone* : Medium, oval ; covered with short and soft fibre all over and medium fibre on the ventral edge ; veins forked and slightly raised.

*Fruit quality* : Good ; bearing medium, mid-season ; fairly susceptible to hoppers and moderately resistant to winds ; keeping-quality good ; peeling-quality medium.)



AZIZ PASAND

The variety is reported to have first originated as a superior chance-seedling in Hasan Yar Khan's garden in Kewal Khan Mohalla of Malihabad in Uttar Pradesh. Hasan Yar Khan himself was not interested in gardening, but one of his sons, who was an enthusiastic fruit grower, propagated it, giving it his own name.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing : top rounded : trunk stocky to medium : shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat : margins inclined to be wavy : venation moderately prominent : tip sub-acuminate : base acute : emerging and immature growing leaves lettuce green turning ecru olive.

*Inflorescence* : Medium, conical, spinel red, moderately puberulent . stamens smaller than pistil and oblique to it : staminodes well developed.

*Fruit* : Medium, ovate oblong : base rounded : stalk inserted squarely : cavity absent : shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve : beak a point to absent : sinus absent to slight : apex rounded : skin thick, smooth, golden glow : dots small, moderately distant, flush with the surface : flesh firm, fibreless, light cadmium : flavour pleasant : taste sweet : juice scanty to moderately abundant.

*Stone* : Medium, oblong oval : covered with dense, short and soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Very good : bearing mid-season : moderately resistant to winds andoppers : keeping and peeling qualities very good.



AZIZ PASAND



AZUMI-US-SAMAR

AZUM-US-SAMAR

The variety is indigenous to Hyderabad (Deccan). The history of its origin and spread is not known. It possesses high fruit quality and deserves to be planted in cottage gardens.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging and immature growing leaves deep chrysolite green turning ecru olive.

*Inflorescence* : Medium, conical, absinthe green, moderately prominent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, oblong sub-reniform ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders equal, level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak slightly prominent to mammiform ; sinus shallow to deep ; apex rounded ; skin medium with the surface ; flesh firm, fibreless, apricot yellow ; flavour pleasant ; taste sweet ; juice scanty.

*Stone* : Oblong ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping-quality good ; peeling-quality medium.



## BAGAL SAHAI

It is also known as *Kasiru Samer*. It owes its origin to Murshidabad in West Bengal. It was introduced in Malihabad in Uttar Pradesh by the Safdar Nursery which has formed the chief source of its distribution in the State in recent years. The history of its origin and spread is not known. It deserves planting in every mango garden.)

*Tree* : Medium, vigorous, spreading, very productive, regular bearing ; top dome shaped ; trunk stocky ; shoots medium thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, slightly folded ; margins entire, inclined to be twisted and crinkled ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves viridine green and immature growing leaves ecru green turning cource green.

*Inflorescence* : Medium, conical, old rose, moderately puberulent ; stamens larger than pistil and oblique to it, staminodes poorly developed.

*Fruit* : Medium, oblong, sub-reniform ; base rounded to obliquely flattened ; stalk inserted obliquely ; cavity absent to slight ; shoulders equal, ventral higher than dorsal, ventral shoulder rising and then ending in a long curve, dorsal shoulder ending in a long curve ; beak absent to point ; sinus shallow ; apex rounded ; skin thick, smooth to rough, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, empire yellow ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Large, oblong ; covered with dense, short and soft fibre all over ; veins parallel and grooved.

*Fruit quality* : Very good ; bearing late-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



BAGAL SAHAI



BANGALORA

## BANGALORA

This is a commercial variety of Southern India. The name *Bangalora* appears to be connected with Bangalore. It is curious that in Bangalore, this fruit is known as *Totapuri*. It is known under different names, viz. *Kallamai*, *Thevadiyamuthi* (in Tamil Districts), *Collector* (in Circars) and *Totapuri*, *Sundersha*, *Burmodilla*, *Killi Mukku* and *Gilli Mukku* in other parts of the Indian Union. The names are derived from the special features of this variety. As the fruit is quite hard, it is known as *Kallamai*—‘Kall’ in Tamil meaning a stone and ‘Amai’ meaning ‘similar’; it is known as *Totapuri* on account of its possessing a sharp curved beak resembling the beak of a parrot (*Tota*); the name *Thevadiyamuthi* owes its origin to *Thevadi* meaning Courtesan and ‘Muthi’, meaning face in Tamil. The fruit is brilliantly coloured, often with a flush of crimson red on shoulders against a yellow background of the skin. This variety has been introduced in tropical America where it has gained fair popularity.

*Tree* : Medium, vigorous to moderately vigorous, spreading, productive, regular bearing; top rounded; trunk medium; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat; margins entire; venation moderately prominent; tip acute; base rounded; emerging leaves hellebore green and immature growing leaves orange citrine turning medal bronze.

*Inflorescence* : Medium, pyramidal, coral red, moderately puberulent; stamens equal and parallel to pistil; staminodes poorly developed.

*Fruit* : Medium, oblong; base necked; stalk inserted squarely; cavity absent; shoulders equal and level, ventral shoulder ending in a long curve, dorsal shoulder sloping abruptly; beak prominent, out curved; apex broadly pointed; sinus shallow; skin thick, golden corn with a rufous blush, smooth; dots medium and close, flush with the surface; flesh firm, fibreless, mustard yellow; flavour sub-acid, insipid to moderately sweet; juice scanty.

*Stone* : Oblong; covered with short, soft and sparce fibre all over; veins forked and slightly depressed.

*Fruit quality* : Poor to medium; bearing heavy, mid-season; moderately susceptible to hopper attack and winds; keeping-quality very good; peeling-quality medium.



## THE MANGO

### BANGANPALLI

This is a commercial variety of Madras State. Little is known regarding its origin. It thrives well in all dry regions where it has been introduced so far. In humid regions, however, the results are not very encouraging. The variety has been introduced in most parts of India, though on a limited scale.

The variety is also known under the names of *Chapta* and *Safeda* in Northern India, *Baneshan* in certain districts of Madras State, and *Chaptai* in the southern districts of Madras State owing to its flat features.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves course green, immature growing leaves pyrite yellow, turning olive green.

*Inflorescence* : Medium, pyramidal, oil green, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Large, obliquely oval ; base obliquely flattened ; stalk inserted slightly obliquely ; cavity shallow ; ventral shoulder markedly broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak a point to missing ; apex broadly pointed ; sinus shallow ; skin thin, smooth and shining, golden glow ; dots medium, distant, flush with the surface ; flesh firm to meaty, fibreless, maize yellow ; flavour pleasant ; taste sweet ; juice moderate.

*Stone* : Oblong ; covered with short, sparse and soft fibre all over ; veins forked and prominently raised.

*Fruit quality* : Good ; bearing heavy, mid-season ; moderately susceptible to hoppers and winds ; keeping and peeling qualities good.



BANGANPALLI



BANKA

BANKA

The variety was selected for study from Saharanpur in Uttar Pradesh. The history of its origin and distribution is not known. It possesses mediocre fruit quality and as such does not deserve extensive popularisation.)

*Tree* : Medium, moderately vigorous, upright to spreading, medium productive, regular bearing ; top rounded to pyramidal ; trunk medium, shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves coral pink, immature growing leaves cobra brown.

*Inflorescence* : Medium, conical, prussian red, sparsely puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Large, oblong sub-reniform ; base rounded ; stalk inserted obliquely ; cavity absent to slight ; shoulders unequal, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus shallow ; apex broadly pointed to rounded ; skin medium thick to thick, smooth, deep chrome ; dots medium, moderately distant, flush with the surface ; flesh soft, fibreless, primuline yellow ; flavour pleasant ; taste sweet to moderately sweet ; juice moderate to abundant.

*Stone* : Medium to large, oblong sub-reniform ; covered with sparse, short and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to hoppers ; fairly resistant to winds ; keeping-quality medium ; peeling-quality good.



### BANSOD

The variety was selected for study from the Government Fruit Experiment Station, Kirkee, Poona. The history of its origin and spread is not known. The variety possesses mediocre fruit qualities and does not, therefore, require further popularisation.

*Tree* : Large, vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly to strongly folded, margins entire to inclined to be twisted, venation prominent, tip acuminate, base acute ; emerging leaves deep chrysolite green, immature growing leaves kaisor brown.

*Inflorescence* : Medium, pyramidal, brick red, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, ovate oblong to oval ; base slightly flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders equal, level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak distinct to slightly prominent ; sinus absent to slight ; apex broadly pointed ; skin medium thick, smooth, golden glow ; dots medium, moderately distant, submerged ; flesh firm, fibreless, primuline yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Large, oblong ; covered with dense, short and soft fibre all over and medium fibre on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium ; mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



BANSOD



BARAMASIA

BARAMASIA

The variety is called *Baramasia* or *All the Year Round* on account of its capacity to bear two crops annually. It is indigenous to Uttar Pradesh. Nothing is known regarding its origin and distribution.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Medium to small, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire to slightly inclined to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute, emerging leaves ecru olive, immature growing leaves buffy citrine.

*Inflorescence* : Medium, conical, prussian red, moderately puberulent ; stamens smaller than pistil, and oblique to it ; staminodes well developed.

*Fruit* : Medium, oblong to oblong sub-reniform ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus shallow ; apex rounded to broadly pointed ; skin medium thick, smooth, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, empire yellow ; flavour pleasant ; taste sweet ; juice scanty.

*Stone* : Small to medium, oblong ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing early to late season ; moderately resistant to hoppers and fairly resistant to winds ; keeping-quality good.



## BEGUM PASAND

The variety is indigenous to West Bengal. The history of its origin and spread is not known. It is, however, believed that, the first few grafts of this variety planted in Rais Mirza Began's garden in Murshidabad must have formed the chief source of spread of this variety in West Bengal. The variety is of mediocre quality and does not deserve further popularisation.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly to strongly folded ; margins inclined to be twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves lettuce green, immature growing leaves mineral green turning lettuce green.

*Inflorescence* : Medium, conical, mineral green, moderately puberulent, stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Small to medium, ovate oblong ; base slightly to obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral broader and slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate to long curve ; beak absent ; sinus slight ; apex rounded ; skin thin to medium thick, smooth, primuline yellow with a blush of cadmium orange on shoulders ; dots small, moderately distant, flush with the surface ; flesh firm to soft, fibreless, cadmium yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Small to medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing medium and mid-season ; fairly resistant to hoppers and winds ; keeping and peeling qualities poor.



BEGUM PASAND



BELKHAS

BELKHAS

The variety was selected for study from the Government Fruit Experiment Station, Kirkee, Poona. Nothing is known about its origin and spread. The variety is of mediocre quality and does not, therefore, deserve further popularisation.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves ecru green, immature leaves dark citrine turning ecru green.

*Inflorescence* : Medium, pyramidal, cosse green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Small to medium, oblong to oblong sub-reniform, base rounded ; stalk inserted squarely ; cavity slight ; shoulders equal, level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak slightly prominent ; sinus slight to shallow ; apex rounded ; skin medium thick, smooth, golden yellow ; dots small, moderately distant, flush with the surface ; flesh firm, sparingly fibrous, cadmium yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense medium and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium, bearing mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



BENAZIR SANDILLA

The variety had its origin as a superior chance-seedling mango in Sandilla—a village in Malihabad tehsil of Lucknow district in Uttar Pradesh. It derives its name from the combination of two words, 'Benazir' meaning the incomparable, and 'Sandilla', the name of the village of origin. According to another version, this variety originated in the backyard of a house belonging to a very charming lady, of the village Sandilla, who was regarded as 'Benazir'!

*Tree* : Medium, vigorous, very productive, regular bearing : top rounded ; trunk stocky ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat to slightly folded : margins wavy venation prominent : tip sub-acuminate : base acute : emerging leaves olive lake, immature growing leaves forest green turning buffy citrine.

*Inflorescence* : Medium, conical, etruscan red, moderately puberulent : stamens smaller than pistil and oblique to it : staminodes poorly developed.

*Fruit* : Large, oblong to oblong oval : base obliquely flattened to rounded : stalk inserted obliquely ; cavity slight : shoulders unequal, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve : beak absent to a point : sinus slight : apex rounded : skin medium thick, smooth, primuline yellow : dots medium and distant, flush with the surface : flesh firm, fibreless, lemon chrome : flavour pleasant : taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong oval : covered with dense, short and soft fibre all over and medium on the ventral edge : veins forked and slightly raised.

*Fruit quality* : Medium to good : bearing heavy, mid-season : moderately resistant to winds and hoppers : keeping-quality medium : peeling-quality good.



BENAZIR SANDILLA



B.ADRUL ASMAR

## DESCRIPTION OF VARIETIES

### BADRUL ASMAR

The name of this variety derives from a combination of the words 'Badrul' meaning moon and 'Asmar' meaning fruits. This variety is also reported to be known in some parts of India as *Jahanpasand*. This owes its origin to a selection from superior chance-seedling in Kakori village near Lucknow which had attracted the attention of Munshi Iheti Shan Ali, a landlord who first propagated the grafts of this variety. It formed the chief source of distribution of this variety.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing, top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, slightly reflexed on the mid-rib, oval lanceolate, flat to slightly folded ; margins entire to inclined to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves lime green, immature growing leaves chrysolite green turning calisette green.

*Inflorescence* : Medium pyramidal, corinthian red, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong ; base obliquely rounded ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded ; dorsal shoulder sloping to ending in a long curve ; beak a point ; sinus slight to shallow ; apex rounded to broadly pointed ; skin medium thick, smooth, deep chrome ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oval ; covered with fairly dense, short and soft fibre all over ; veins forked and prominently raised.

*Fruit quality* : Good ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping-quality good ; peeling-quality medium.



## THE MANGO

### BHADURIYA

This variety derives its name from 'Bhadon' a Hindu month corresponding to July-August. As the fruit ripens very late in the season—sometime about August—this variety is known as 'Bhaduriya'. The history of its origin and spread is not known. Its cultivation is at present restricted to parts of Uttar Pradesh only.

*Tree* : Small to medium, moderately vigorous, upright to spreading, productive, regular bearing : top rounded to vase form : trunk slender : shoots medium to thick.

*Leaves* : Small, spreading, slightly to strongly reflexed on the mid-rib, oval lanceolate, slightly folded : margins entire, inclined to be twisted : venation moderately prominent : tip sub-acuminate : base acute : emerging leaves dresden brown, immature growing leaves amber brown turning sudan brown.

*Inflorescence* : Medium to large, conical, corinthian red, moderately puberulent : stamens smaller than pistil and oblique to it : staminodes well developed.

*Fruit* : Medium, ovate oblong : base slightly flattened : stalk inserted squarely : cavity slight : shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in moderate to long curve : beak slight but distinct : sinus slight to shallow : apex broadly pointed : skin medium to thick, smooth, golden glow : dots small, moderately distant, flush with the surface : flesh firm, sparingly fibrous, primuline yellow : flavour pleasant : taste sweet : juice moderately abundant.

*Stone* : Medium, oblong : covered with short and soft fibre all over, veins parallel and slightly depressed.

*Fruit quality* : Very good : bearing heavy and late season : moderately resistant to hoppers and winds : keeping and peeling qualities good.



BHADURIYA



BHAWANI CHOWRAS

## DESCRIPTION OF VARIETIES

### BHAWANI CHOWRAS

The variety owes its origin to Murshidabad in West Bengal. The history of its origin is not known. It is believed to have spread from grafts first planted in Rais Mirza Began's orchards in Murshidabad. The variety is widely distributed in Murshidabad and Nadia districts and to a lesser extent in Hoogly and 24-Parganas districts of West Bengal.

*Tree* : Medium, moderately vigorous, spreading, medium productive, inclined to be alternate bearing ; top rounded ; trunk medium to slender ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves mignonethe green, immature growing leaves deep chrysolite green turning buffy citrine.

*Inflorescence* : Medium, pyramidal, cobra brown, densely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, oval ; base obliquely rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus absent to slight ; apex rounded to broadly pointed ; skin thin, smooth, ta-ming, dots small, moderately distant, flush with the surface ; flesh firm to soft, sparingly fibrous, primuline yellow ; flavour pleasant with traces of turpentine ; taste sweet ; juice moderately abundant.

*Stone* : Small to medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins parallel and grooved.

*Fruit quality* : Medium to good ; bearing medium, mid-season ; fairly resistant to hoppers and winds ; keeping and peeling qualities poor.



## THE MANGO

### BHARAT BHOG

The variety is reported to be indigenous to Malda district in West Bengal. It is also known as *Loha Jung* in Malda, apparently due to the very high keeping-quality of the fruit. From Malda this variety is believed to have been introduced into Bihar by Bharat Lal, a native of Bhagalpur, from where it has spread to other parts of Bihar. The fruit is now known in Bihar State as *Bharat Bhog*—after Bharat Lal who first introduced the variety.

*Tree* : Medium to large, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves dark citrine, immature growing leaves buffy olive turning dark citrine.

*Inflorescence* : Medium, pyramidal, buffy citrine, moderately puberulent ; stamens unequal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, obliquely oval to oblong ; base obliquely rounded to flattened ; stalk inserted slightly obliquely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak distinct to slightly prominent ; sinus absent to slight ; apex broadly pointed ; skin thick, smooth, gross green ; dots large, distant, flush with the surface ; flesh firm, fibreless, orange ; flavour pleasant to delightful ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with fairly dense, short and soft fibre all over ; veins parallel, slightly to prominently raised.

*Fruit quality* : Medium ; bearing medium, mid-season ; moderately resistant to winds and hoppers ; keeping-quality good, peeling-quality medium.



BHARAT BHOG



BHOPLI

## DESCRIPTION OF VARIETIES

### BHOPLI

The variety is indigenous to Ratnagiri district of Bombay State. As it represents one of the oldest varieties of mango from Ratnagiri, its history of origin and distribution is not known. The variety does not possess very good fruit qualities to need wider popularisation.)

*Tree* : Large, moderately vigorous, upright, medium, productive, alternate bearing ; top oval ; trunk stocky ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation obscure ; tip acuminate ; base acute ; emerging leaves of isabella colour, immature growing leaves orange citrine turning dresden brown.

*Inflorescence* : Medium, broadly pyramidal, ecru green, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium to large, roundish to roundish oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders equal, ventral frequently higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak absent ; sinus absent ; apex rounded ; skin medium thick, smooth, deep chrome ; dots small, distant, submerged ; flesh soft, fibreless, cadmium yellow ; flavour mildly pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium to large, oval ; covered with sparse, short and soft fibre all over and medium on the ventral edge ; veins forked, prominently raised.

*Fruit quality* : Medium to poor ; bearing medium, late season ; moderately resistant to hoppers and susceptible to winds ; keeping-quality poor ; peeling-quality medium.



## THE MANGO

### BLACK ANDREWS

The variety is native to certain districts of Andhra State. The history of its origin is not known. It is of a mediocre type and has no special features to justify wider distribution.

*Tree* : Large, moderately vigorous, spreading, medium productive, uncertain bearing, dome shaped ; trunk stocky to medium ; shoots medium thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves forest green, immature growing leaves dark purple turning ochre red.

*Inflorescence* : Medium to large, shrimp pink, sparsely puberulent ; stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Medium, ovate ; base slightly flattened ; stalk inserted squarely ; cavity slight ; ventral shoulder equal and level with dorsal and ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak distinct to slightly prominent ; sinus slight ; apex rounded ; skin medium thick, leathery, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh soft, fibreless, light cadmium ; flavour pleasant ; taste medium sweet ; juice abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Medium ; bearing medium, mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



BLACK ANDREWS



BOMBAY

## DESCRIPTION OF VARIETIES

### BOMBAY

This is a commercial variety from Bihar State. The history of its origin and distribution is not known. Being the first among the mangoes of Bihar to come to the stage of harvesting in the fruiting season, this variety is favoured by many growers as it yields economic returns. It is called *Malda* in West Bengal and Bihar.)

*Tree* : Medium, moderately vigorous, slow growing, spreading, productive, regular to uncertain bearing ; top rounded to base form ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; twisted venation moderately prominent ; tip acute ; base acute ; emerging leaves dresden brown, immature growing leaves kaiser brown turning dresden brown.

*Inflorescence* : Medium, conical, ecru olive, moderately puberulent ; stamens unequal, smaller than pistil and parallel to it ; staminodes well developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate to long curve ; beak absent to a point ; sinus slight ; apex rounded ; skin medium to thick, smooth, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong oval ; covered with fairly dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium to good ; bearing early ; moderately resistant to hoppers and winds ; keeping-quality good, peeling-quality medium.



BOMBAY ABDUL HUQ

The variety was studied from Safdar Nursery at Malihabad, Lucknow. The mother tree existed at Amaniganj near Malihabad from where the proprietors of Safdar Nursery have propagated it. It is a mediocre mid-season variety.

*Tree* : Large, moderately vigorous, spreading, medium productive, with uncertain bearing ; top rounded ; trunk stocky and shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat and inclined to be folded ; margins wavy ; venation moderately prominent ; tip acute ; base acute ; emerging leaves old gold colour, immature growing leaves old gold turning citrine.

*Inflorescence* : Medium, conical, chalet red, moderately puberulent ; stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Medium, ovate oblong ; base obliquely flattened, stalk inserted obliquely ; cavity slight ; shoulders unequal, ventral higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak slight but prominent ; sinus absent ; apex broadly rounded ; skin medium to thick, smooth, lemon yellow ; dots medium and moderately distant ; flush with the surface ; flesh firm, moderately fibrous, light chrome ; flavour mildly pleasant ; taste moderately sweet and juice moderately abundant.

*Stone* : Medium, oblong ; fibrous, fibres sparse, soft to medium, short all over and medium on the ventral edge ; veins parallel and forked and slightly raised.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities moderate.



BOMBAY ABDUL HUQ



BOMBAY BHUTTO

## DESCRIPTION OF VARIETIES

### BOMBAY BHUTTO

The origin and distribution of this variety are not known. It was first planted at the Government Fruit Experiment Station, Kirkee, from where it has spread to a limited extent to other parts of the country. It is of a mediocre type, and does not warrant popularisation.

*Tree* : Small to medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves sudan brown, immature growing leaves verona brown, turning deep chrysolite green.

*Inflorescence* : Medium, conical, tawny olive, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders equal, ventral higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate to long curve ; beak absent to a point ; sinus absent ; apex rounded ; skin medium thick, smooth, golden glow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour mildly pleasant ; taste medium sweet to insipid ; juice moderately abundant.

*Stone* : Medium, oval ; covered with dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium to poor ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping-quality poor to medium ; peeling-quality medium,



BOMBAY DARSHA

The variety was selected for study from the Government Fruit Experiment Station, Kirkee, Poona. The history of its origin and distribution is not known. It possesses mediocre qualities, and does not, therefore, need further popularisation.

*Tree* : Medium to large, moderately vigorous, spreading, medium to unproductive, regular bearing : top rounded : trunk stocky : shoots slender to medium thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded : margins entire, inclined to be wavy : venation moderately prominent : tip sub-acuminate : base acute : emerging leave ecru olive, immature growing leaves of isabella colour.

*Inflorescence* : Small to medium, pyramidal, olive ochre, moderately puberulent : stamens unequal, larger than pistil and oblique to it : staminodes poorly developed.

*Fruit* : Medium, oblong oval to oblong : base tapering to obliquely rounded : stalk inserted squarely : cavity absent : shoulders unequal, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve to sloping : beak absent to a point : sinus absent to slight : apex broadly pointed to rounded : skin thin to medium, smooth, capucine yellow : dots medium, moderately distant, flush with the surface : flesh firm to soft, sparingly fibrous, cadmium yellow : flavour mildly pleasant : taste medium sweet to insipid : juice moderately abundant.

*Stone* : Medium, oblong : covered with fairly dense, short and soft fibre all over and medium on the ventral edge : veins slightly forked and raised.

*Fruit quality* : Medium : bearing mid-season : moderately resistant to hoppers and winds : keeping-quality poor to medium : peeling-quality medium.



BOMBAY DARSHA



BOMBAY GREEN

BOMBAY GREEN

The history of origin of this variety is not known. It is, however, believed to have been originated as a superior chance-seedling variety. It has gained wide popularity in most parts of the Indo-Gangetic plain due to its capacity to produce crops of fruits very early in the season which fetch comparatively better returns. It is commonly known as *Malda* in Northern India.)

*Tree* : Large, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick to thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy ; venation moderately prominent ; tip acute ; base acute ; emerging leaves citrine, immature growing leaves buffy citrine turning orange citrine.

*Inflorescence* : Medium, conical, light corinthian red, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium, ovate oblong to oblong reniform ; base obliquely flattened ; stalk inserted obliquely ; cavity shallow ; shoulders unequal, ventral broader and higher, ventral shoulder rising and then rounded. dorsal shoulder ending in a long curve ; beak absent ; sinus shallow ; apex rounded to broadly pointed ; skin thick, smooth, spinach green ; dots large, moderately distant, flush with the surface ; flesh firm to soft, fibreless, mikado orange ; flavour pleasant and strong ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing heavy and early ; moderately resistant to winds and hoppers ; keeping-quality medium, peeling-quality good.



## BOMBAY YELLOW

The history of origin and distribution of this variety is not known. It is, however, believed that it must have developed as a choice seedling mango from Bombay. It has gained wide popularity in most parts of the Indo-Gangetic plain due to its capacity to produce fruits very early in the season fetching comparatively better income. The fruit of this variety resembles that of *Bombay Green* except for the colour of skin.

*Tree* : Medium, vigorous, spreading, medium productive, alternate bearing ; top rounded ; trunk medium thick ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins inclined to be wavy ; venation moderately prominent ; tip acute ; base acute ; emerging leaves isabella colour, immature growing leaves orange citrine turning dresden brown.

*Inflorescence* : Medium, conical, antique brown, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate to long curve ; beak absent ; sinus slight ; apex rounded ; skin thick, smooth, golden glow ; dots large, distant, flush with the surface ; flesh firm, fibreless, capucine yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Good to very good ; medium productive and early ; moderately resistant to hoppers and winds ; keeping-quality medium ; peeling-quality good.



BOMBAY YELLOW



BORSHA KALAMISAR

## DESCRIPTION OF VARIETIES

### BORSHA KALAMSAR

The variety is indigenous to Gujerat where it has gained fair popularity. The history of its origin and distribution is not known. It has spread to a limited extent in Berar in Madhya Pradesh and the Mahratwada parts of Hyderabad State. The variety was studied from the Government Fruit Experiment Station, Kirkee, Poona.

*Tree* : Small to medium, slow growing to moderately vigorous, upright to spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Medium spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy and inclined to be twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves citrine, immature growing leaves ecru green turning tawny olive.

*Inflorescence* : Small to medium, pyramidal, sprinel red, moderately puberulent ; stamens unequal, larger than and oblique to pistil ; staminodes poorly developed.

*Fruit* : Small to medium, ovate to ovate oblong ; base slightly flattened to rounded ; stalk inserted squarely ; cavity absent ; shoulders level, ventral shoulder broader than dorsal and rounded, dorsal shoulder ending in a long curve ; beak absent to point ; sinus slight ; apex rounded ; skin medium thick, smooth, primuline yellow with a blush of corinthian red on shoulders ; dots small and close, flush with the surface : flesh firm, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Small, oblong ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Good ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping-quality good ; peeling-quality medium.)



BRINDABANI

The variety owes its origin to Murshidabad in West Bengal. The history of its origin and distribution is not known. It is, however, reported to have spread from its first graft planted in Rais Mirza Began's orchards in Murshidabad. It deserves to be planted in cottage gardens.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular to uncertain bearing ; top rounded ; trunk medium ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, inclined to be crinkled, slightly folded ; margins entire ; venation moderately prominent to obscure ; tip sub-acuminate ; base acute ; emerging leaves mustard yellow, immature growing leaves lime green turning deep chrysolite green.

*Inflorescence* : Medium, pyramidal, lettuce green, moderately puberulent ; stamens shorter than and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium ; ovate oblong to oblong ; base slightly flattened ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus absent to slight ; apex broadly pointed ; skin thin, smooth, deep chrome ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, capucine yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Good ; bearing medium, early ; fairly resistant to hoppers and winds ; keeping-quality good ; peeling-quality medium.



BRINDABANI



BUDDIPASAND

## BUDDIPASAND

The variety is indigenous to the Cuddapah and Chittoor districts of Andhra State. The history of its origin and spread is not known. Its distribution has been rather limited, as it has no special qualities to recommend it for popularisation. It is occasionally introduced from the various private nurseries at Chittoor into the other districts of Madras State owing to certain attractive morphological features of the fruit. It has a peculiar hooked beak which makes it conspicuous among other varieties.

*Tree* : Small to medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves of isabella colour, immature growing leaves medal bronze turning yellowish citrine.

*Inflorescence* : Medium, pyramidal, cosse green, moderately puberulent ; stamens shorter than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium to large, roundish ; base flattened ; stalk inserted squarely ; cavity shallow to deep ; shoulders equal, level and rounded ; beak prominent, incurved ; sinus absent ; apex rounded ; skin medium thick, golden glow ; dots medium, moderately distant, submerged to flush with the surface ; flesh soft to buttery, fibreless, deep chrome ; flavour mildly pleasant ; taste moderately sweet ; juice scanty to fairly abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing medium and mid-season ; fairly susceptible to winds and highly susceptible to hoppers ; keeping-quality medium.



## BUDDU KA KELWA

The variety is reported to have originated as a superior chance-seedling in Shamsul-ulema garden owned by Maulana Moulvi Imdad Saheb in Maliahabad in Uttar Pradesh. Its real name is *Kelwa Mishri*. Being of a highly superior quality, it has spread in recent years to many places in Uttar Pradesh and Bihar. It is now known as *Buddu ka Kelwa* as it is reported to have been first propagated and planted by a *mali* named Buddu.

*Tree* : Medium, moderately vigorous, spreading, very productive, alternate bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy and twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves olive lake, immature growing leaves citrine turning ecru olive.

*Inflorescence* : Medium, conical, deep vinaceous, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong sub-reniform ; base rounded ; stalk inserted obliquely ; cavity absent ; shoulders equal and level, ventral shoulder ending in a long curve, dorsal shoulder sloping ; beak absent to a point, sinus shallow ; apex rounded ; skin medium thick, smooth, light chrome ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, pinard yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong sub-reniform ; covered with fairly dense, short and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Very good ; bearing heavy and mid-season ; moderately resistant to hoppers and winds ; keeping-quality medium, peeling-quality good.



BUDDU KA KELWA



CHAMBATAN

## DESCRIPTION OF VARIETIES

### CHAMBATAN

The variety was studied from the Government Fruit Research Station, Kodur in Andhra State. The history of its origin is not known.

*Tree* : Large, vigorous, spreading, medium productive, regular bearing ; top dome shaped ; trunk stocky ; shoots medium thick.

*Leaves* : Medium to large, spreading, strongly reflexed on the mid-rib, elliptic lanceolate, slightly twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves chalet red, immature growing leaves light russet green.

*Inflorescence* : Large, broadly pyramidal, colour grapefruit, sparsely puberulent ; stamens smaller than and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong ; base obliquely rounded ; cavity absent ; shoulders unequal, ventral higher than dorsal and rounded, dorsal shoulder falling abruptly then ending in a moderate curve ; beak slight but distinct ; sinus shallow ; apex flattened ; skin thin to moderately thick, smooth and warty at times, colour deep chrome ; dots medium and moderately distant ; flush with the surface ; flesh firm, sparsely fibrous, golden yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong, fibrous ; fibres medium, short all over and medium on the ventral edge ; veins parallel and forked and slightly depressed.

*Fruit quality* : Medium ; bearing mid to late season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



## COWASJI PATEL

The variety is indigenous to Bombay State. The history of its origin and spread is not known. It is believed that it has derived its name from Cowasji Patel, possibly the person who first propagated it from a superior chance-seedling. The variety, although poor in quality, is still popular owing to its wide-spread use for preparing mango products like "murabba" mango candy, pickle etc.

*Tree* : Medium, vigorous to moderately vigorous, spreading, unproductive to medium productive, regular bearing ; top rounded ; trunk medium ; shoots thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base rounded ; emerging leaves hellebore green, immature growing leaves orange citrine turning medal bronze.

*Inflorescence* : Medium, pyramidal, lettuce green, densely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Large, irregularly oval ; base rounded to obliquely flattened ; stalk inserted squarely ; cavity shallow to deep ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight ; apex rounded ; skin thick, rough to warty, spinach green ; dots small, distant, flush with the surface ; flesh firm to tough, fibreless, apricot yellow ; flavour acid ; taste sour ; juice scanty.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over ; veins parallel, slightly depressed.

*Fruit quality* : Poor as a desert fruit and good for culinary purposes ; bearing mid to late season ; moderately resistant to hoppers and winds ; keeping-quality poor ; peeling-quality medium.



COWASJI PATEL



FAKIRWALA

DADAMIYO





### FAJRI ZAFRANI

The variety derives its name from 'Fajri', the name of a lady, and 'Zafran', an expensive and richly fragrant product. It is also said to have been named *Kakaran Jan Saheb*, 'Kakaran' being a species of Cucurbit of a thin reniform shape, and 'Jan Saheb' a Christian mango grower of Saharanpur who had first grown it in his garden. The variety was first propagated and planted by Muhammed Ahmed Khan, the elder brother of the present proprietor of Henbane Nursery at Saharanpur who is said to have named it *Fajri Zafrani*.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk stocky ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves cinnamon brown, immature growing leaves medal bronze turning citrine.

*Inflorescence* : Medium, conical, yellow ochre, sparsely puberulent ; stamens smaller than pistil and oblique to it, staminodes poorly developed.

*Fruit* : Large, oblong sub-reniform ; base obliquely rounded ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral shoulder broader than dorsal and rounded, dorsal shoulder sloping to ending in a long curve ; sinus shallow ; apex rounded ; skin thin to medium thick, smooth to inclined to be rough, ta-ming ; dots small, distant ; flush with the surface ; flesh firm to soft, fibreless, deep chrome ; flavour pleasant, taste sweet ; juice moderate to abundant.

*Stone* : Large, oblong sub-reniform ; covered all over with dense, short and soft fibre ; veins parallel, slightly depressed.

*Fruit quality* : Good to very good ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



FAJRI ZAFRANI



FAJRI

## FAJRI

The variety is reported to have originated as a superior chance tree in the courtyard of a house belonging to a lady named Fajri of Bhagalpur in Bihar State. In recent years, it has spread from its original source to almost all parts of the Indo-Gangetic plain and parts of West Bengal and Uttar Pradesh. Due to the very desirable qualities possessed by the fruit, this variety has gained popularity wherever it has been introduced. It is well suited for commercial planting.)

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire, inclined to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging and immature growing leaves citrine, turning dresden brown.

*Inflorescence* : Medium, conical, olive ochre, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Large, obliquely oval ; base obliquely rounded ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak distinct to slightly prominent ; sinus shallow ; apex rounded ; skin medium thick, smooth, inclined to be warty, light chrome ; dots small, moderately distant, flush with the surface ; flesh firm to soft, fibreless, light cadmium, flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Large, oblong ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good to very good ; bearing mid to late season ; moderately resistant to winds and hoppers ; keeping-quality good ; peeling-quality medium.



## THE MANGO

### DOPHOOL

The variety was selected for study from Cuttack in Orissa State. It is also found distributed in West Bengal and Bihar States. The history of its origin and distribution is not known. Its importance is largely due to its capacity to bear two crops in a year. It bears medium to heavy early crop, and also a sparse off season crop, for which reason it is grown at many places notwithstanding the mediocre quality of its fruit.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky ; shoots medium thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, flat ; margins entire, inclined to be wavy ; venation moderately prominent ; tip acute ; base acute ; emerging and immature growing leaves mineral green.

*Inflorescence* : Medium to large, conical, pansy purple, moderately puberulent ; stamens unequal, larger than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Small, ovate oblique ; base obliquely rounded ; stalk inserted obliquely ; cavity absent ; ventral shoulder rounded, dorsal shoulder ending in a moderate to long curve ; beak distinct to slightly mammiform ; sinus slight ; apex rounded ; skin thick, smooth, bronze yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, yellow ochre ; flavour mildly pleasant ; taste medium sweet ; juice scanty to moderately abundant.

*Stone* : Small to medium, oval ; covered with fairly dense, short and soft fibre all over and medium on the ventral edge ; veins parallel and slightly to prominently raised.

*Fruit quality* : Medium ; bearing early and off season ; moderately resistant to winds and hoppers ; keeping-quality good ; peeling-quality medium.)



DOPHOOL



DOODIA

DOODIA

The variety is from Hyderabad (Deccan) and it is also called *Doodia Mulgoa*. The history of its origin and spread is not known. It possesses good fruit quality and surely deserves a place in cottage gardens.

*Tree* : Medium, moderately vigorous, spreading, unproductive to medium productive, regular bearing ; top rounded ; trunk medium, shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire, inclined to be wavy ; venation moderately prominent ; tip acuminate ; base acute ; emerging and immature growing leaves orange citrine turning orange.

*Inflorescence* : Medium, pyramidal, chrysolite green, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large ; roundish oblique ; base obliquely flattened ; stalk inserted squarely ; cavity shallow ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rounded to rising and then rounded, dorsal shoulder rounded to ending in a moderate curve ; beak a point ; sinus absent ; apex rounded ; skin thick, smooth, ta-ming ; dots small and close, flush with the surface ; flesh firm to soft, fibreless, apricot yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oval to oblong ; covered with fairly dense, short and soft fibre all over ; veins forked, slightly to prominently raised.

*Fruit quality* : Good ; bearing medium, mid-season ; moderately resistant to winds and hoppers ; keeping-quality medium to good ; peeling-quality medium.



DONDAKAYALUMANU

The variety flourishes very well in the Visakhapatnam district of Andhra State, where it seems to have originated.

*Tree* : Medium ; top rounded ; shoots thick.

*Leaves* : Out held, slightly reflexed and folded ; emerging leaves lime green, immature growing leaves deep chrysolite green, turning olive yellow.

*Inflorescence* : Medium, lime green, densely puberulent ; stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Small, oblong reniform ; base rounded ; stalk inserted squarely ; cavity none ; ventral shoulder equal to and level with dorsal and ending in a long curve, dorsal shoulder sloping abruptly ; beak absent ; sinus shallow to deep ; apex rounded ; skin medium-thick, golden glow ; dots small and close ; flesh soft ; deep chrome, moderately fibrous, fibres long and soft ; flavour delightful ; taste sweet to very sweet ; juice abundant to fairly plentiful.

*Stone* : Oblong ; covered with soft and long fibre all over ; veins parallel and grooved.

*Fruit quality* : Very good ; bearing heavy, mid-season ; moderately resistant to winds and hoppers ; keeping-quality fair to medium.



DONDAKAYALUMANU



DILPASAND

DILPASAND

The variety is indigenous to certain districts of Andhra State. The history of its origin and distribution is not known. It is of mediocre type, and does not require wider distribution, although it is successfully cultivated in all dry tracts where it has been introduced.

*Tree* : Medium, moderately vigorous, upright to spreading, productive, regular bearing ; top rounded to vase form ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves citrine, immature growing leaves ecru green turning tawny olive.

*Inflorescence* : Medium, pyramidal, coral red, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder sloping to ending in a moderate curve, dorsal shoulder ending in a long curve ; beak mammiform ; apex broadly pointed ; sinus shallow ; skin thick, smooth, sunflower ; dots medium and close, flush with the surface ; flesh firm, fibreless, mustard yellow ; flavour pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Oblong ; covered with short, soft and sparse fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing medium, mid-season ; moderately susceptible to hoppers and winds ; keeping-quality medium.



## THE MANGO

### DUSEHRI AMAN

The variety derives its name from that of a village between Lucknow and Malihabad owned by the Nawab of Lucknow. It owes its origin to a superior chance-seedling in the garden of the Nawab. A few grafts of the variety are reported to have been first presented by the Nawab to Alamgir Khan of Malihabad who planted these in his garden, which formed the chief source of its spread in later years. It has desirable fruit qualities and is found very promising in most of the places where it has been introduced. It is well distributed all over the Indo-Gangetic plain and Bengal in the North, and as far as Hyderabad (Deccan) in the South. The variety compares favourably with the *Alphonso* of Bombay State to which it resembles in taste as well in respect of the colour of the pulp. It is, however, smaller in size than *Alphonso* variety. The features which appear to have hampered a wider spread of the variety in South are its small size and inability to develop the rich orange yellow colour that it acquires in Northern India when fully ripe.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium, shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire, inclined to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves ecru green, immature growing leaves dresden brown turning citrine.

*Inflorescence* : Medium, pyramidal, mignonette green, sparsely pubescent ; stamens smaller than and oblique to pistil ; staminodes poorly developed.

*Fruit* : Small to medium, oblong to oblong-oblique ; base rounded to obliquely rounded ; stalk inserted squarely ; cavity absent ; shoulders equal, ventral higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus absent ; apex rounded ; skin medium thick, smooth, primuline yellow ; dots medium and close, flush with the surface ; flesh firm, fibreless, capucine yellow ; flavour pleasant ; taste, sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oblong ; covered with fairly dense, short and soft fibre all over ; veins parallel and slightly to prominently raised.

*Fruit quality* : Good to best ; bearing heavy and mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



DUSEHRI AMAN

## FAKIRWALA

The history of origin and distribution of this variety is not known. It is, however, believed to have originated as a superior chance-seedling in the garden of a *fakir* after whom it has been named. This variety has spread in Bhopal and other neighbouring places in Uttar Pradesh.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire, inclined to be wavy and twisted ; venation moderately prominent ; tip sub-acuminate to acuminate ; base acute ; emerging leaves orange, immature growing leaves coral red.

*Inflorescence* : Medium conical, light coral red, sparsely puberulent ; stamens smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium to large, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity shallow ; shoulders unequal, ventral higher and broader than dorsal ; ventral shoulder rising and then rounded ; dorsal shoulder ending in a long curve ; beak absent ; sinus shallow ; apex broadly pointed to rounded ; skin medium thick, smooth, primuline yellow ; dots small, close, flush with the surface ; flesh soft, fibreless, primuline yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Large, oblong ; covered with dense, short and soft fibre all over ; veins parallel and slightly depressed.

*Fruit quality* : Fair to medium ; bearing heavy to medium, early to mid-season ; moderately resistant to hoppers ; fairly resistant to winds ; keeping-quality poor ; peeling-quality good.

## DADAMIYO

This is a fairly good variety from Baroda State. It is a choice bearing variety. Its cultivation is confined to a limited area. The history of its origin is not known.

*Tree* : Medium, moderately vigorous, spreading, regular and heavy bearing ; top rounded ; trunk medium ; shoots thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, strongly folded ; margins entire ; venation prominent ; tip acute ; base rounded ; emerging leaves light orange citrine, immature growing leaves orange citrine turning ecru olive.

*Inflorescence* : Medium, pyramidal, cource green, sparsely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, ovate ; base slightly flattened to tapering ; stalk inserted squarely ; cavity absent ; shoulders equal, dorsal higher than ventral, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak slight but distinct ; sinus absent to slight ; apex rounded to flattened ; skin medium thick, smooth to rough, deep chrome, with a blush of pepper red on ventral shoulder ; dots small to medium and moderately distant ; flush with the surface ; flesh firm, fibreless, cadmium ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium to long, oval oblong ; fibrous, fibres medium to abundant, moderately soft, covered all over, larger on the ventral edge ; veins parallel forked and grooved.

*Fruit quality* : Good ; bearing mid to late season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



## THE MANGO

### FAKR-US-SAMAR

The variety is indigenous to Hyderabad State. The history of its origin and distribution is not known. It possesses mediocre fruit qualities.

*Tree* : Small, slow growing, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins twisted ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves oil green, immature growing leaves olive lake turning isabella.

*Inflorescence* : Medium, conical, absinthe green, sparsely puberulent ; stamens unequal, small and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, roundish oblique ; base obliquely flattened ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder rounded to ending in a moderate curve ; beak slight but distinct ; sinus absent ; apex rounded ; skin medium thick, smooth, brass ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, pinard yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Oval to oblong oval ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing late season ; fairly resistant to hoppers and winds ; keeping-quality good ; peeling-quality medium.



FAKR-US-SAMAR



FAZLI MALDA

## DESCRIPTION OF VARIETIES

### FAZLI MALDA

This is a commercial variety of West Bengal, and is known as 'Fazli Malda' or 'Fasli Malda'. The mother tree is reported to be from one of the gardens in Malda, from where it has spread far and wide in Bengal and parts of Uttar Pradesh and Bihar. The variety apparently derives its name from the place where it has originated. )

*Tree* : Medium, moderately vigorous, spreading, medium to productive, regular bearing ; top rounded ; trunk medium ; shoots medium to thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire ; venation moderately prominent : tip acute ; base rounded ; emerging leaves lime green turning isabella.

*Inflorescence* : Medium, pyramidal, coral pink ; moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Large, oblong oblique ; base obliquely flattened to rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder sloping ; beak mammiform ; sinus slight ; apex rounded to broadly pointed ; skin medium thick ; smooth, cerise green ; dots medium, close, flush with the surface ; flesh firm, fibreless, cosse green when mature and primuline yellow when fully ripe ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Large, oblong ; covered with short, sparse and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Good ; bearing heavy, late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



## THE MANGO

### FAZLI ZUMKO

The variety is indigenous to Malda district of West Bengal. It is widely grown in Malda and the surrounding districts, and to a lesser extent in Hooghly district. It derives its name from its cluster-bearing nature: 'Zumko', meaning cluster, and 'Fazli' in reference to the Fazli Malda variety to which it resembles in respect of the features of the fruit. This variety is suited for commercial planting.

*Tree* : Medium to large, vigorous, spreading, productive, regular to alternate bearing ; top rounded ; trunk stocky ; shoots medium to thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves orange citrine, immature growing leaves orange citrine turning saccardos umber.

*Inflorescence* : Medium, pyramidal, coral pink, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Large, oblong oblique ; base obliquely flattened to rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak distinct ; sinus absent to slight ; apex broadly pointed ; skin medium to thick, cosse green, when fully mature primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, apricot yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Large, oblong ; covered with short, sparse and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium to good ; bearing heavy, mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities good.



FAZLI ZUMKO



FERNANDIN

## DESCRIPTION OF VARIETIES

### FERNANDIN

This is one of the oldest varieties of Konkan in Bombay State. The history of its origin and distribution is not known. Some fruit growers believe this variety to have been originated in Portuguese Goa from where it is said to have spread to the adjoining districts of Ratnagiri and North Kanara in Bombay State. It possesses very high fruit quality, and deserves to be popularised on a wide scale.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing, dome shaped ; trunk medium ; shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat, slightly folded ; margins entire, twisted ; venation moderately prominent ; tip acuminate ; base rounded ; emerging and immature growing leaves olive lake turning dresden brown.

*Inflorescence* : Medium, conical, prussian red, densely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, oval to obliquely oval ; base obliquely rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus absent ; apex broadly pointed ; skin medium thick, smooth, primuline yellow with a blush of jasper red on shoulders ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, lemon chrome ; flavour delightful to piquant ; taste sweet to very sweet ; juice moderate to abundant.

*Stone* : Medium, oblong oval ; covered with medium, dense and soft fibre all over ; veins parallel and grooved.

*Fruit quality* : Good to very good ; bearing late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



## THE MANGO

### GEORGE

The variety is cultivated in Ratnagiri district of Bombay State. The history of its origin and distribution is not known. It possesses mediocre qualities and does not, therefore, merit wider cultivation.

*Tree* : Medium, moderately vigorous, upright, medium to unproductive, uncertain to alternate bearing ; top oval, trunk medium : shoots medium thick.

*Leaves* : Medium, erect, slightly reflexed on the mid-rib, oval lanceolate, strongly folded ; margins entire, inclined to be twisted ; venation prominent ; tip acuminate ; base acute : emerging leaves buffy citrine immature growing leaves saccardos umber turning antique brown.

*Inflorescence* : Medium, conical, olive ochre, moderately puberulent ; stamens unequal, smaller than pistil and parallel to it : staminodes poorly developed.

*Fruit* : Medium, obliquely oval ; base obliquely rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak slightly prominent : sinus absent : apex broadly pointed to rounded ; skin medium thick, smooth, deep chrome ; dots large, distant, flush with the surface ; flesh soft, fibreless, cadmium yellow ; flavour mildly pleasant ; taste moderate to sweet ; juice moderate to abundant.

*Stone* : Medium, oblong : covered with fairly dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium, bearing late season : moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



GEORGE



GOLANDAS

GOLANDAS

The variety is from Ratnagiri district of Bombay State. The history of its origin and distribution is not known. It does not possess fruit qualities that would commend it for wider cultivation.

*Tree* : Medium, moderately vigorous, spreading, medium productive. regular bearing, dome shaped ; trunk stocky ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, slightly folded ; margins entire, inclined to be twisted ; venation prominent ; tip acuminate ; base rounded ; emerging leaves ecru green, immature growing leaves dark citrine turning citrine.

*Inflorescence* : Medium, conical, viridine green, moderately puberulent ; stamens unequal, smaller than pistil and parallel to it ; staminods poorly developed.

*Fruit* : Small, roundish oblique ; base rounded to obliquely flattened ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak absent ; sinus slight to shallow ; apex rounded ; skin medium thick, smooth, deep chrome ; dots medium, close, flush with the surface ; flesh firm, sparingly fibrous, cadmium yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Small, roundish, oval ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing early season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities medium.



## THE MANGO

### GOPAL BHOG

The variety was selected for study from Saharanpur in Uttar Pradesh. The history of its origin and distribution is not known. It possesses good fruit qualities and deserves popularisation, especially for planting in cottage gardens. The only defect of this variety is its unattractive colour and poor keeping-quality.)

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent to obscure ; tip sub-acuminate ; base acute ; emerging leaves rainette green, immature growing leaves ecru olive.

*Inflorescence* : Medium, conical, light corinthian red, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium, ovate oblong ; base obliquely flattened ; stalk inserted obliquely ; cavity absent to slight ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate to long curve ; beak a point to missing ; sinus slight to shallow ; apex rounded to broadly pointed ; skin medium thick, smooth to rough, citrine with splashes of primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium ; flavour pleasant to delightful ; taste sweet ; juice moderately abundant.

*Stone* : Small to medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins parallel and grooved.

*Fruit quality* : Good, heavy bearing, early ; moderately resistant to hoppers and fairly resistant to winds ; keeping-quality poor ; peeling-quality good.



GOPAL BHOG



GOPTA

## GOPTA

The variety was selected for study from the Government Fruit Experiment Station, Kirkee, Poona. The history of its origin and distribution is not known. The variety possesses mediocre fruit quality and does not, therefore, need popularisation.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly to strongly folded ; margins inclined to be wavy ; venation moderately prominent ; tip acute ; base acute ; emerging leaves orange citrine, immature growing leaves yellowish citrine turning ecru olive.

*Inflorescence* : Medium, pyramidal, viridine green, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Small to medium, ovate ; base slightly flattened ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder sometimes slightly higher than dorsal and rounded, dorsal shoulder ending in a moderate curve ; beak slight but distinct ; sinus absent to slight ; apex broadly pointed to rounded ; skin medium thick, smooth, primuline yellow ; dots medium and distant, flush with the surface ; flesh firm, fibreless, mustard yellow ; flavour mildly pleasant ; taste moderately sweet to insipid ; juice moderately abundant.

*Stone* : Small, oblong ; covered with sparse, short and soft fibre all over ; veins forked and slightly to prominently raised.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



## GULAB JAMAN

This variety is reported to have originated as a superior chance-seedling in the orchards of Khan Bahadur Vajiuddin in Meerut. As this tree originated in a garden surrounded by rose and *jaman* (*Syzygium* Sp.) plants, the owner of the tree named it as *Gulab Jaman*. The nomenclature of this variety has therefore nothing to do with the taste or flavour resembling that of a rose or *jaman*.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire to inclined to be twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves dresden brown, immature growing leaves orange citrine turning verona brown.

*Inflorescence* : Medium, conical, brick red, moderately puberulent ; stamens smaller than and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate oblong ; base slightly flattened ; stalk inserted squarely ; cavity slight to absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak a point to distinct ; sinus shallow ; apex rounded to broadly pointed ; skin thick, deep chrome ; dots small, distant, flush with the surface ; flesh firm, fibreless, empire yellow ; flavour pleasant to delightful ; taste sweet ; juice moderate to abundant.

*Stone* : Medium, oblong ; covered with fairly dense, short, soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing heavy, mid to late season ; moderately resistant to hoppers and winds ; keeping-quality medium ; peeling-quality good.



GULAB JAMAN



GULAB KHAS

## GULAB KHAS

The variety is indigenous to Bihar State. The history of its origin and distribution is not known. It has spread in recent years in Uttar Pradesh. The variety derives its name from the fragrant smell of the fruit which is regarded by some to resemble that of a rose (*Gulab* means rose and *Khas* means special).

The fruit is very attractive in appearance with a flush of bright red colour on the shoulders. It possesses excellent quality and sells at a premium in the market.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins wavy ; venation obscure to moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves deep chrysolite green, immature growing leaves mignonette green.

*Inflorescence* : Medium, pyramidal, lime green, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Small to medium, oblong oblique ; base necked to tapering ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder ending in a long curve, dorsal shoulder sloping to falling abruptly ; beak distinct to prominent ; sinus slight to shallow ; apex rounded ; skin medium to thick, smooth to inclined to be rough, cadmium yellow with a blush of firefly on shoulders ; dots medium and close, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour delightful to piquant ; taste very sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins parallel and slightly raised.

*Fruit quality* : Very good ; bearing heavy, mid-season ; moderately resistant to winds and hoppers ; keeping-quality very good ; peeling-quality medium.



## THE MANGO

### HAMLET

The variety is from Trichur in Travancore-Cochin. The history of its origin and distribution is not known. The variety is used mostly for culinary purposes as it is ideal for pickling.

*Tree* : Medium, moderately vigorous to slow growing, upright to spreading, medium to unproductive, regular bearing ; top rounded to oval ; trunk stocky to medium ; shoots thick.

*Leaves* : Medium to large, drooping, strongly reflexed on the mid-rib, oval lanceolate, strongly folded ; margins entire ; venation prominent ; tip acute ; base acute ; emerging leaves pyrite yellow, immature growing leaves cinnamon brown turning amber brown.

*Inflorescence* : Large, conical, rose dore, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Large, oblong oval ; base rounded and slightly extended ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder ending in a long curve, dorsal shoulder ending in a long curve ; beak absent to a point ; sinus slight ; apex rounded ; skin medium thick, smooth, deep chrome ; dots small, distant, flush with the surface ; flesh soft, sparingly fibrous, deep chrome ; flavour acid ; taste sour ; juice moderately abundant.

*Stone* : Large, oblong ; slightly fibrous, fibres medium and soft all over ; veins forked and prominently raised.

*Fruit quality* : Poor as a dessert fruit but good for culinary purposes ; bearing medium to poor, mid-season ; fairly resistant to hoppers and winds ; keeping-quality poor ; peeling-quality medium.



HAMLET



НАТНІЖУЛ

## HATHIJHUL

The variety was selected for study from Saharanpur, in Uttar Pradesh. The history of its origin and distribution is not known. Its name appears to have been derived from the peculiar shape of the fruit which resembles the trunk of an elephant.

The variety possesses mediocre merits and does not deserve special efforts at popularisation. Its only noteworthy feature is the exceptionally large fruits which it bears, and which evoke curiosity when exhibited.

*Tree* : Medium, moderately vigorous, spreading, medium productive, alternate bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium to small, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy ; slightly twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves dark citrine, immature growing leaves light brownish olive turning kaiser brown.

*Inflorescence* : Medium, conical, deep vinaceous, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Large, oblong oblique ; base obliquely flattened ; stalk inserted squarely ; cavity shallow to deep ; shoulders unequal, ventral higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus shallow ; apex broadly pointed to rounded ; skin medium thick, smooth to inclined to be rough, primuline yellow ; dots small, distant, submerged ; flesh soft, fibreless, light cadmium ; flavour pleasant ; taste sweet to moderately sweet ; juice moderately abundant.

*Stone* : Large, oblong ; covered with short and soft fibre all over and medium on the ventral edge.

*Fruit quality* : Medium, bearing early to mid-season ; moderately resistant to hoppers and winds ; keeping-quality poor ; peeling-quality medium.



## THE MANGO

### HIMSAGAR

The variety is indigenous to Bengal. The history of its origin and distribution is not known. It is, however, believed that the first grafts of this variety, planted in Raiz Mirza Bagan orchards in Murshidabad, formed the chief source of its spread in almost all parts of Bengal, where it has been cultivated in recent years. This is one of the choice varieties of Bengal and has gained extensive popularity. It possesses excellent fruit qualities and is very desirable for planting in cottage gardens.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation obscure ; tip acute ; base rounded to acute ; emerging leaves citrine, immature growing leaves russett vinaceous turning orange citrine.

*Inflorescence* : Medium, pyramidal, cource green, densely puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, ovate to ovate oblique ; base slightly to obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders equal, ventral shoulder slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak absent ; sinus absent to slight ; apex rounded ; skin medium thick, smooth, capucine yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour delightful, well blended with a tinge of turpentine ; taste very sweet ; juice abundant.

*Stone* : Medium, oblong oval ; covered with short, dense and soft fibre all over and medium on the ventral edge ; veins parallel and slightly depressed.

*Fruit quality* : Good ; bearing heavy and early ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



HIMSAGAR



HUSHNARA

## HUSHNARA

The history of origin and distribution of this variety is not known for certain. It is reported to have originated in Bihar State, whence, it is believed, it spread to Uttar Pradesh where it is also known as *Yakutia*. It was selected for study from its graft plants in the orchard of the Agricultural College at Sabour in Bihar State.

This is a very attractive variety possessing high fruit qualities, and is, therefore, very suitable for planting as a choice variety in house gardens.

*Tree* : Medium to large, moderately vigorous, spreading, medium productive, regular to alternate bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves antique brown, immature growing leaves isabella colour turning citrine.

*Inflorescence* : Medium, conical, buffy citrine, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium, oblong oblique ; base obliquely rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder sloping to falling abruptly ; beak distinct ; sinus shallow ; apex rounded ; skin medium thick, smooth, golden glow, with a blush of rose dore on shoulders ; dots medium, close, flesh with the surface ; flesh soft to firm, fibreless, apricot yellow ; flavour pleasant ; taste deliciously sweet ; juice moderate to abundant.

*Stone* : Medium, oblong ; covered all over with dense, short and soft fibre ; veins parallel, slightly depressed to grooved.

*Fruit quality* : Good ; bearing medium and mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



## IMAM PASAND

The variety owes its origin to the untiring efforts of one of the Nawabs of Masulipatnam in the Krishna district of Andhra State. It is one of the best varieties of Indian mango, and is ideally suited for dessert, table and show purposes. It is held in high esteem by all mango growers who prefer fruit quality to heavy cropping propensity of a variety.

The variety is also known to some mango orchardists of the circars as *Himayuddin*. The original plant is in Hyderabad where it is known as *Himayat* and is fairly ornamental with narrow and wavy leaves. The fruit should be harvested when fully mature, for if plucked earlier it would never develop its taste fully and would remain comparatively insipid though ripened after harvesting.

*Tree* : Medium, moderately vigorous, spreading, medium productive top rounded ; trunk medium ; shoots slender.

*Leaves* : Lanceolate, flat ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves orange citrine, immature growing leaves acajou red turning light seal brown.

*Inflorescence* : Large, conical, acajou red, densely puberulent ; stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Large, obliquely oval ; base obliquely flattened ; stalk inserted squarely ; cavity none ; ventral shoulder broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder sloping ; beak distinct ; sinus absent ; apex rounded ; skin medium thick ; deep chrome ; dots small and distant ; flush with the surface to slightly submerged ; flesh firm, fibreless, empire yellow ; flavour piquant ; taste very sweet ; juice moderate to abundant.

*Stone* : Oblong ; covered with short and soft fibre all over ; veins forked and prominently raised.

*Fruit quality* : Very good ; bearing poor to medium, mid-season ; moderately resistant to hoppers and winds ; keeping-quality good.



IMAM PASAND



INAYAT PASAND

## DESCRIPTION OF VARIETIES

### INAYAT PASAND

The variety is from Murshidabad in West Bengal. It is said to have been introduced in Uttar Pradesh from Rais Mirza Bagan orchards in Murshidabad. Proper history of its origin and distribution is, however, not known.

*Tree* : Medium, vigorous, spreading, very productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat to slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging and immature growing leaves lettuce green.

*Inflorescence* : Medium, pyramidal, citron green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Medium, ovate ; base obliquely flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders unequal, ventral slightly higher and broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak a point to slightly prominent ; sinus absent ; apex rounded to broadly pointed ; skin medium thick, smooth, primuline yellow ; dots small, moderately distant, flush with the surface, flesh firm, fibreless, capucine yellow ; flavour pleasant to delightful ; taste very sweet ; juice scanty to moderately abundant.

*Stone* : Small, oblong oval ; covered with short, dense and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Good to very good ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping-quality good ; peeling-quality good to medium.



## THE MANGO

### JAILOR

It is a fairly good variety, restricted to the Salem district of Madras State only. The history of its origin is not known.

*Tree* : Medium ; top rounded ; shoots medium thick.

*Leaves* : Out-held with sub-acuminate tip slightly folded and moderately reflexed : emerging leaves citrine, immature growing leaves ecru green turning rainette green.

*Inflorescence* : Medium, lumiere green, moderately puberulent ; stamens equal and parallel to pistil : staminodes poorly developed.

*Fruit* : Large, elliptic : base tapering ; stalk inserted obliquely ; cavity absent : ventral shoulder broader than and level with dorsal, ending in a long curve, dorsal shoulder sloping abruptly : beak a point : sinus slight : apex rounded : skin medium-thick, primuline yellow : dots medium, moderately distant : flesh firm, fibreless, colour primuline yellow : flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Oblong ; covered with short and stiff fibre all over and medium on the ventral edge ; veins forked and slightly raised.

*Fruit quality* : Good : bearing medium, mid-season : fairly susceptible to winds and hoppers ; keeping-quality medium.



JAILOR



JALI BUNDHA

## JALI BUNDHA

The variety is indigenous to Uttar Pradesh. The history of its origin and distribution is not known. It possesses mediocre fruit qualities, and does not, therefore, need any efforts for further spreading.)

*Tree* : Medium, moderately vigorous, spreading to creeping, medium productive, regular bearing ; top rounded to dome shaped ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly to strongly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate to acuminate ; base acute ; emerging leaves deep chrysolite green, immature growing leaves oil green turning cerro green.

*Inflorescence* : Medium, conical, lettuce green, sparsely puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Large, ovate ; base slightly to obliquely flattened ; stalk inserted squarely ; cavity absent ; shoulders unequal and level, ventral shoulder broader than dorsal and rounded, dorsal shoulder ending in a moderate curve ; beak slight but distinct ; sinus absent to slight ; apex rounded ; skin thick, smooth to inclined to be rough, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour mildly pleasant ; taste moderately sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oval ; covered with dense, short and soft fibre all over ; veins parallel and prominently raised.

*Fruit quality* : Good ; bearing late season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities good.



## THE MANGO

### JAMADAR

This is a well known variety of Kathiawar which has been spreading in recent years in Gujerat. It closely resembles the *Alphonso* variety except for the smaller size of the fruit. It is differentiated from other varieties of mango grown in Gujerat by the characteristic dagger-like mark it carries near the beak. The variety derives its name from 'Jamaiyo' in Gujerat meaning a dagger. It is believed to have originated as a superior chance-seedling from the *Bombay Alphonso* in Mahuva, a village in Bhavanagar State. It bears good commercial crops and deserves to be introduced in other regions also.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium to thick.

*Leaves* : Medium to large, spreading, slightly to strongly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire to inclined to be twisted ; venation moderately prominent ; tip acuminate ; base acute ; emerging and immature growing leaves buffy citrine.

*Inflorescence* : Medium, pyramidal, prussian red, moderately puberulent ; stamens unequal, smaller than pistil and parallel to it ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders equal, ventral higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak slight but distinct ; sinus absent ; apex broadly pointed ; skin thin, smooth, ta-ming ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, capucine yellow ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oval ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing early ; moderately resistant to winds and hoppers ; keeping-quality good ; peeling-quality medium.



JAMADAR



JANARDHAN PASAND

## JANARDHAN PASAND

The variety owes its origin to the East Godavary district of Andhra State. Being a late bearing variety, it has gained considerable importance as it fetches good price for its crop. The fruit is very attractive. It is blushed all over with deep red colour leaving only the apex end of the fruit which is brightly coloured orange yellow. It bears in clusters and is a very desirable variety deserving wider popularisation in all dry regions. In Northern India where there is a bias for coloured fruits, this variety is likely to gain considerable popularity.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium, shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves orange citrine, immature growing leaves diamine brown turning cinnamon brown.

*Inflorescence* : Medium, conical, spectrum red, densely puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium, oblong ; base rounded and slightly extended ; stalk inserted squarely ; cavity absent ; beak mammiform ; shoulders equal and level, ventral shoulder rounded to ending in a moderate curve, dorsal shoulder ending in a long curve ; sinus shallow ; apex rounded ; skin medium thick, leathery, cadmium with a blush of red feather on most parts of the fruit ; dots small, distant, submerged to flush with the surface ; flesh firm, fibreless, empire yellow ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Oblong ; covered with short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing medium, mid to late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



## JEHANGIR

The variety owes its origin to the Krishna district of Andhra State : and is believed to have been produced by one of the ruling Nawabs of Masulipatnam. It possesses exceptionally high fruit quality, and is well known in South India as one of the best dessert, table, and exhibition fruits. The variety is shy bearing and very easily susceptible to severe attack of mangooppers and the accompanying sooty mould disease infestation which has perhaps restricted its spread. In Hyderabad State it is known as *Umdra*.

*Tree* : Medium, moderately vigorous, spreading, unproductive, uncertain bearing ; top rounded ; trunk medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves yellowish citrine, immature growing leaves olive ochre, remaining the same.

*Inflorescence* : Medium, pyramidal, corinthian red, densely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Large, ovate ; base slightly flattened and extended ; stalk inserted squarely ; cavity absent ; beak absent ; shoulders equal, level and rounded, sinus absent ; apex broadly pointed ; dots medium, distant, slightly submerged ; skin thick and tough, deep chrome ; flesh firm to soft, fibreless, lemon chrome ; flavour delightful to piquant ; taste very sweet ; juice moderate to abundant.

*Stone* : Oblong, covered with short and soft fibre all over, veins forked and prominently raised.

*Fruit quality* : Best : bearing poor, mid-season ; badly susceptible tooppers and winds ; keeping and peeling qualities medium.



JEHANGIR



JOHNSON

## JOHNSON

This is a fairly good variety studied at the Government Fruit Research Station, Sabour in Bihar. The history of its origin and spread is not known.

*Tree* : Medium to large, fairly vigorous, spreading, medium productive, regular bearing ; top dome shaped ; trunk stocky and shoots medium thick.

*Leaves* : Medium, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margin entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves lettuce green, immature growing leaves lettuce green turning cource green.

*Inflorescence* : Medium, conical, maroon red, moderately puberulent ; stamens smaller than pistil and oblique to it, staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely rounded to slightly extended ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral higher than dorsal and rounded, dorsal shoulder sloping and ending in a moderate curve ; beak absent to a point ; sinus absent to slight ; apex rounded ; skin moderately thick and smooth, primuline yellow ; dots medium and moderately distant, flush with the surface ; flesh firm to soft, slightly fibrous, light chrome ; flavour aromatic ; taste sweet ; juice abundant.

*Stone* : Medium, oblong, fibrous ; fibres medium, moderately soft ; covered with short fibre all over and medium on the ventral edge ; veins parallel and forked and slightly depressed.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping-quality fair and peeling-quality medium.



## THE MANGO

### KACHMUHA

The variety is indigenous to the Punjab State. The history of its origin and distribution is not known. It was selected for study from Lateef Gardens at Panipat, the Punjab, where it is cultivated. It possesses good fruit qualities and is suitable for house gardens.

*Tree* : Medium, moderately vigorous, spreading, medium productive, uncertain bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, slightly folded ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base rounded ; emerging leaves isabella color, immature growing leaves acajou red.

*Inflorescence* : Medium, conical, pansy purple, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes moderately developed.

*Fruit* : Medium, ovate oblique, base obliquely flattened ; stalk inserted squarely ; cavity shallow to deep ; shoulders equal, ventral higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak distinct ; sinus absent ; apex broadly pointed ; skin medium thick, smooth, primuline yellow ; dots medium to large, moderately distant, flush with the surface ; flesh soft, fibreless, apricot yellow ; flavour pleasant ; taste sweet ; juice moderate to abundant.

*Stone* : Medium to small, oblong ; covered with fairly dense, short and soft fibre all over and medium on the ventral edge ; veins parallel and slightly depressed.

*Fruit quality* : Good, bearing mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



KACHMUHA



KATHKI

## KAITHKI

The history of origin and distribution of this variety is not known. It is believed to have been originated in Bihar State, as its cultivation is not noticed in any other State in India. The variety is of mediocre quality and does not deserve much popularisation.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire to twisted ; venation moderately prominent ; tip acute ; base acute ; emerging leaves chrysolute green.

*Inflorescence* : Medium, pyramidal, dark vinaceous, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium to small, oblong ; base rounded ; stalk inserted obliquely ; cavity absent ; shoulders equal, ventral slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus absent to slight ; apex rounded ; skin medium thick, smooth to inclined to be rough, box green ; dots small, close, flush with the surface ; flesh firm to soft, fibreless, orange ; flavour mildly pleasant ; taste medium to sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and coarse fibre all over ; veins forked and slightly grooved.

*Fruit quality* : Medium ; bearing medium and late season ; moderately resistant to winds and hoppers ; keeping and peeling qualities poor.



### KALAPAHAR

The variety is indigenous to the Punjab State. The history of its origin and distribution is not known. It possesses mediocre fruit qualities, and does not need further popularisation.

*Tree* : Medium, vigorous, spreading, very productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins twisted, venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves deep chrysolite green, immature growing leaves lettuce green.

*Inflorescence* : Medium, conical, etruscan red, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Large, ovate ; base slightly flattened ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak slight but distinct ; sinus slight ; apex broadly pointed ; skin medium thick, smooth, primuline yellow ; dots medium, distant, flush with the surface ; flesh soft to firm, fibreless, cadmium yellow ; flavour pleasant ; taste sweet to moderately sweet ; juice moderately abundant.

*Stone* : Medium to large, oblong oval ; covered with dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium, bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



KALAPAHAR



KALEPAD

## KALEPAD

The variety is indigenous to certain districts of Andhra State. The history of its origin and distribution is not known. It has been gaining wide popularity in many districts of Madras State in recent years as it bears heavy crops in clusters. The variety is known as *Kallapady* in the South Kanara district and *Katti Neelum* in the Tanjore district of Madras State.

*Tree* : Medium to dwarf, moderately vigorous to slow growing, spreading, productive, regular bearing ; top rounded ; trunk slender ; shoots slender.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, elliptic lanceolate, slightly folded ; margin entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves madder brown, immature growing leaves spinel red turning dark vinaceous.

*Inflorescence* : Medium, conical, corinthian red, sparsely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Small, ovate oblique to oblong oblique ; base obliquely rounded ; stalk inserted squarely ; cavity slight to absent ; shoulders equal, ventral higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak mammiform ; sinus slight ; apex rounded ; skin medium thick, smooth, cadmium yellow ; dots medium, close, flush with the surface ; flesh firm to meaty, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Oblong oval ; covered with short, soft and sparse fibre all over ; veins forked and prominently raised.

*Fruit quality* : Good ; bearing heavy, mid-season ; moderately resistant to hoppers and winds ; keeping-quality good ; peeling-quality medium



## THE MANGO

### KALIPARI

The variety is indigenous to Hyderabad. The history of its origin and distribution is not known.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded to dome shaped ; trunk medium ; shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the midrib, oval lanceolate, slightly folded ; margins inclined to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves ecru olive, immature growing leaves lime green.

*Inflorescence* : Medium, conical, absinthe green, moderately puberulent ; stamens unequal, longer than and oblique to pistil ; staminodes poorly developed.

*Fruit* : Large, oblong, sub-reniform ; base rounded ; stalk inserted squarely ; cavity absent ; shoulder equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak slightly prominent to mammiform ; sinus shallow ; apex rounded ; skin medium to thick, smooth to rough, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, apricot yellow ; flavour pleasant ; taste moderate to sweet ; juice scanty to moderately abundant.

*Stone* : Large, oblong ; covered with dense and short to medium, soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Medium to good ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping-quality medium to good ; peeling-quality medium.



KALIPARI



KANCHA MITHA

## KANCHA MITHA

This is a Murshidabad variety which has spread widely in recent years in the 24 Parganas district of West Bengal. The history of its origin and distribution is not known. It is, however, reported that the first grafts of the variety planted at Rais Mirza Bagan orchards at Murshidabad formed the principal source of its distribution in most parts of Bengal. The variety derives its name from the use to which it is put—"Kancha" meaning raw, and 'Mitha' meaning sweet, the fruit being eaten when it is raw.)

*Tree* : Medium, vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky ; shoots medium to thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat, inclined to be crinkled ; margins wavy ; venation moderately prominent ; tip acute ; base acute ; emerging leaves saccardos umber, immature growing leaves lettuce green.

*Inflorescence* : Medium, conical, lettuce green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate oblong ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal and level, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight to absent ; apex rounded ; skin thin, smooth, capucine yellow ; dots small, moderately distant, flush with the surface ; flesh firm to soft, fibreless, deep chrome ; flavour pleasant ; taste sweet ; juice moderate to abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing medium and mid-season ; fairly resistant to winds and hoppers ; keeping-quality poor ; peeling-quality good.



## THE MANGO

### KANDEL

The history of origin and distribution of this variety is not known. Its cultivation is restricted to Uttar Pradesh at present. It is, however, believed that its name must have been derived from 'Kandel' which means a decorated paper lamp. It is a juicy variety.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins inclined to be wavy ; venation moderately prominent ; tip acute ; base acute ; emerging leaves citrine, immature growing leaves medal bronze turning kaiser brown.

*Inflorescence* : Medium, conical, acajou red, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate ; base slightly flattened ; stalk inserted squarely ; cavity absent to slight ; shoulders unequal and level, ventral shoulder broader than dorsal and rounded, dorsal shoulder ending in a moderate curve ; beak absent ; sinus absent to slight ; apex rounded ; skin thick, smooth to rough, primuline yellow ; dots medium, distant, flush with the surface ; flesh firm to soft, sparsely fibrous, empire yellow ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oblong oval ; covered with sparse to fairly dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities good.



KANDEL



KARELIA

## DESCRIPTION OF VARIETIES

### KARELIA

The variety is indigenous to Uttar Pradesh. The history of its origin and distribution is not known. The variety derives its name from 'Karela' meaning a bitter gourd to which it resembles in respect of the skin.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire to inclined to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves orange citrine, immature growing leaves dark citrine.

*Inflorescence* : Medium, conical, etruscan red, moderately puberulent ; stamens unequal, smaller than pistil and parallel to it ; staminodes poorly developed.

*Fruit* : Medium to large, oblong reniform ; base tapering to rounded ; stalk inserted obliquely ; cavity absent ; shoulders equal and level ; ventral shoulder ending in a long curve ; dorsal sloping to falling abruptly ; beak a point to distinct ; sinus shallow to deep, apex rounded ; skin thick, warty, light cadmium ; dots small and distant, submerged ; flesh soft, fibreless, golden glow ; flavour mildly pleasant ; taste moderately sweet ; juice scanty to moderately abundant.

*Stone* : Large, oblong sub-reniform ; covered with sparse, short and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Poor ; bearing late season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities poor.



KARUTHA KOLAMBAN

This is a fairly good variety recorded from the Government Fruit Research Station, Kodur, Andhra State. The history and origin of this variety are not known.)

*Tree* : Large, vigorous, spreading, medium productive, regular bearing : top rounded : trunk stocky : shoots medium thick to thick.

*Leaves* : Medium to large, spreading, strongly reflexed on the mid-rib, oval lanceolate, strongly folded : margins wavy or twisted : venation moderately prominent : tip acute : base acute : emerging leaves cosse green, immature growing leaves moss green, remaining the same.

*Inflorescence* : Medium to large, pyramidal, corinthian red, moderately puberulent : stamens smaller than pistil and oblique to it : staminodes poorly developed.

*Fruit* : Medium, ovate-oblong : base obliquely rounded : stalk inserted obliquely : cavity absent to slight : shoulders unequal, ventral lower than dorsal, ventral shoulder sloping and falling, dorsal shoulder ending in a long curve : beak a point : sinus absent to slight : apex rounded : skin medium thick, smooth, primuline yellow, dots medium and moderately distant, flush with the surface : flesh soft to moderately firm, golden yellow : flavour mildly pleasant : taste sweet : juice abundant.

*Stone* : Medium, oblong, moderately fibrous : fibres medium all over and large on the ventral edge : veins parallel and forked and slightly depressed.

*Fruit quality* : Fair : bearing mid-season : moderately resistant to hoppers and winds : keeping and peeling qualities medium.



KARUTHA KOLAMBAN



KHANGARI BACHA

KHANGARI BACHA

The variety originated as a superior chance-seedling in the premises of Taleribagh Garden belonging to the District Board at Muzaffargarh in the West Punjab. Due to the exceptional qualities of its fruit, it was propagated by enthusiastic fruit growers in the Punjab and was planted in various orchards.

*Tree* : Medium, vigorous, spreading, very productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly to strongly reflexed on the midrib, oval lanceolate, slightly folded ; margins wavy to twisted ; venation moderately prominent ; tip subacuminate ; base acute ; emerging leaves medial brown.

*Inflorescence* : Medium, conical, buffy citrine, moderately puberulent ; stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Small, ovate oblong ; base rounded and slightly lipped or extended ; stalk inserted squarely ; shoulders unequal and level, ventral shoulder rounded to ending in a moderate curve, dorsal shoulder ending in a long curve ; beak absent ; sinus slight to shallow ; apex broadly pointed ; skin medium to thick, smooth, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm to soft, sparingly fibrous, primuline yellow ; flavour pleasant ; taste sweet ; juice moderate to abundant.

*Stone* : Small, oblong oval ; covered with sparse, short and soft fibre all over, veins forked and slightly depressed.

*Fruit quality* : Good ; bearing heavy and mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



KHASA IBRAHIMPUR

The variety originated as a superior chance-seedling in Ibrahimpur village in Maliahabad tehsil of Lucknow district in Uttar Pradesh. It derives its name from 'Khas', meaning special, and 'Ibrahimpur' the name of the village where it first originated – thus implying that it is a speciality of Ibrahimpur.

*Tree* : Large, vigorous, spreading, very productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat and inclined to be crinkled ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves medal bronze, immature growing leaves dresden brown, remaining the same.

*Inflorescence* : Medium, conical, mineral green, moderately puberulent ; stamens equal and oblique to pistil, staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity shallow ; shoulders equal, ventral shoulder higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak slight but distinct ; sinus absent ; apex broadly pointed ; skin thick, smooth, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, light cadmium ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good to very good ; bearing heavy, early to late season ; moderately resistant to hoppers and winds ; keeping-quality medium ; peeling-quality good.



KHASA IBRAHIMPUR



KHAS-UL-KHAS

## KHAS-UL-KHAS

The history of origin and distribution of this variety is not known. It derives its name from the exceptionally high quality of its fruit—Khas-ul-Khas—meaning ‘best of all’. It was selected for study from the grafts planted at the orchards of the Agricultural College, Sabour, in Bihar. The variety is more desirable for planting as a choice variety in house gardens than for commercial planting.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves orange citrine, immature growing leaves prout's brown turning kaiser brown.

*Inflorescence* : Medium, pyramidal, buffy citrine, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large ; ovate to ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak a point to distinct ; sinus slight to shallow ; apex rounded ; skin thick, smooth, inclined to be rough, empire yellow ; dots medium, distant, submerged ; flesh firm to soft, sparingly fibrous, apricot yellow ; flavour pleasant to delightful ; taste very sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins parallel, slightly depressed to grooved.

*Fruit quality* : Very good ; bearing medium, mid-season ; moderately resistant to winds and hoppers ; keeping-quality medium to good ; peeling-quality medium.



### KHEERA

The variety is indigenous to East Punjab. The history of its origin and distribution is not known. Being of a mediocre type it does not need further popularisation.

*Tree* : Medium, vigorous, spreading, medium productive, regular bearing : top rounded : trunk medium : shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy to twisted ; venation moderately prominent ; tip sub-acuminate ; base acute : emerging leaves grape green, immature growing leaves rainette green turning ecru green.

*Inflorescence* : Medium, conical, cosse green, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong sub-reniform ; base rounded : stalk inserted squarely ; cavity absent ; shoulders unequal and level, dorsal shoulder broader than ventral, ventral shoulder ending in a long curve ; beak a point ; sinus shallow ; apex rounded ; skin medium to thick, smooth, golden glow ; dots small, moderately distant, flush with the surface ; flesh firm fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Medium to small, oblong to oblong oval ; covered with fairly dense and short to medium soft fibre all over ; veins parallel and slightly depressed.

*Fruit quality* : Medium : mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



KHEERA



KHUDADAD

## KHUDADAD

The variety is from the Salem district of Madras State. Its history is not known. The variety has spread in recent years to coastal districts such as South Kanara, Malabar and Travancore-Cochin where it is fast becoming popular. Among the reasons which have restricted its wider popularity is its poor keeping-quality which does not lend itself to export easily. It is, therefore, suitable only for sale in the local markets. The fruit is large, very attractive with a bright blush of red on the shoulders on a background of orange yellow colour of the skin.)

*Tree* : Medium, vigorous, spreading, productive, regular bearing ; top rounded ; trunk stocky to medium ; shoots medium thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acuminate ; base rounded ; emerging leaves citrine, immature growing leaves ecru olive turning olive lake.

*Inflorescence* : Medium, pyramidal, nepal red, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Large, broadly oval ; base rounded to slightly obliquely flattened ; stalk inserted squarely ; cavity slight, ventral shoulder equal and level with dorsal, rounded, dorsal shoulder ending in a long curve ; beak a point ; sinus slight ; apex rounded ; skin thick, cadmium yellow ; dots medium, moderately distant, submerged ; flesh soft, fibreless, primuline yellow ; flavour delightful ; taste sweet ; juice abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over ; veins forked and raised.

*Fruit quality* : Medium to poor ; bearing medium to heavy, mid-season ; moderately resistant to winds and hoppers ; keeping-quality medium to poor.



## THE MANGO

### KHUDDUS

The variety is native to certain districts of Andhra State. Little is known about its origin and distribution. It has no special merits except that it bears crops early in the fruiting season and is very attractive, being flushed with deep crimson red colour on the shoulders with a background of orange yellow colour of the skin. Being an early bearing variety, it brings comparatively better returns to the cultivator.

*Tree* : Large, vigorous to moderate, spreading, productive, regular bearing ; top dome shaped ; trunk stocky ; shoots thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat, crinkled ; margins entire ; venation prominent ; tip acuminate ; base rounded ; emerging leaves mignonette green, immature growing leaves hellebore green turning medal bronze.

*Inflorescence* : Large pyramidal, shrimp pink, moderately puberulent ; stamens shorter than pistil and parallel to it, staminodes poorly developed.

*Fruit* : Small, ovate oblong to ovate ; base rounded ; stalk inserted squarely ; cavity none ; ventral shoulder equal to and level with dorsal, rounded, dorsal shoulder ending in a long curve ; beak mammiform ; sinus shallow ; apex rounded ; skin medium thick, leathery, deep chrome with a blush of light coral red on shoulders ; dots medium, moderately distant, flush with the surface ; flesh firm to soft, fibreless, capucine yellow ; flavour pleasant ; taste medium sweet ; juice moderate to abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over and medium on the ventral edge ; veins parallel to forked, slightly depressed.

*Fruit quality* : Medium ; bearing mid to late ; moderately susceptible to hoppers and winds ; keeping-quality good.



**KHUDDUS**



KINTALVANIPETA

KINTALVANIPETA

The variety originated in the Bobbili taluk of Visakhapatnam district of Andhra State. It was first grafted from a superior chance-seedling in Bobbili. In recent years it has been spreading slowly in Madras State. It is also known as *Bobbili Punasa* and *Bobbili Pedda Kayalu Punasa*. The only feature of importance of this variety is its tendency to bear two crops in a year.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, elliptic lanceolate, flat ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves citrine, immature growing leaves medal bronze turning yellowish citrine.

*Inflorescence* : Medium, conical, viridine green, moderately puberulent ; stamens shorter than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium, ovate sub-reniform ; base slightly to obliquely flattened ; stalk inserted squarely ; cavity shallow ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; stalk inserted squarely ; beak a point to missing ; sinus shallow ; apex rounded ; skin medium thick, capucine yellow ; dots medium, distant, flush with the surface ; flesh soft, cadmium yellow, moderately fibrous, fibres medium, moderate and soft ; flavour mildly pleasant ; taste medium sweet ; juice fairly plentiful.

*Stone* : Oblong oval ; covered with short and soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Medium, bearing medium, mid and off-season ; moderately resistant to hoppers and winds ; keeping-quality medium to poor.



## THE MANGO

### KISHEN BHOOG

The variety is indigenous to Murshidabad in West Bengal. It is grown in Nadia and 24 Parganas districts of West Bengal. The history of its origin and distribution is not known. It is, however, reported that the first grafts of the variety planted in Rais Mirza Bagan orchards in Murshidabad, formed the main source of its distribution. It is suited for planting in house gardens.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium to slender ; shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins inclined to be wavy, twisted ; venation moderately prominent ; tip sub-acuminate ; base rounded to acute ; emerging and immature growing leaves dark citrine.

*Inflorescence* : Medium, conical, buffy citrine, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, roundish oblique ; base obliquely flattened ; stalk inserted obliquely ; cavity shallow ; shoulders unequal, ventral shoulder broader and higher than dorsal, ventral shoulder rising and then rounded ; dorsal shoulder rounded to ending in a moderate curve ; beak slight to distinct ; apex broadly rounded ; skin medium thick, smooth, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, sparingly fibrous, light cadmium ; flavour pleasant, with trace of turpentine ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oval ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins parallel and slightly to prominently raised.

*Fruit quality* : Good ; bearing medium, mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



KISHEN BHOG



KOHITTOOR

## DESCRIPTION OF VARIETIES

### KOHITOOR

The variety originated in Murshidabad in West Bengal. The history of its origin and distribution is not known. It is believed to have spread from its first grafts planted in Rais Mirza Bagan orchards in Murshidabad. It is widely distributed in Murshidabad and Nadia districts, and to a lesser extent in Hooghly and 24 Parganas districts of West Bengal.

*Tree* : Medium to large, vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky to medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, slightly folded ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging and immature growing leaves lettuce green.

*Inflorescence* : Medium, conical, absinth green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, ovate to ovate oblique, base slightly to obliquely flattened ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rounded to rising and then rounded, dorsal shoulder ending in a long to moderate curve ; beak absent to a point ; sinus slight ; apex broadly pointed to rounded ; skin medium thick, smooth, deep chrome ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium to large, oblong to oblong oval ; covered with dense to moderate, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing early season ; fairly resistant to hoppers and winds ; keeping and peeling qualities good.



## THE MANGO

### KOLANKA GOVA

The variety is indigenous to the Visakhapatnam district of Andhra State. The history of its origin and distribution is not known. Once it formed a very important commercial variety of Circar tract of Madras State. Its importance is now diminishing due to the introduction of more profitable varieties in this tract. The only desirable feature of this variety is its capacity to bear fruits late in the season which fetch good returns.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat : margins entire : venation moderately prominent : tip acute : base rounded to obtuse : emerging leaves orange citrine, immature growing leaves medal bronze turning sudan brown.

*Inflorescence* : Medium, pyramidal, acajou red, moderately puberulent : stamens equal and parallel to pistil : staminodes poorly developed.

*Fruit* : Medium, oval : base rounded and slightly extended : stalk inserted squarely : cavity absent : shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve : beak out-curved : sinus slight to shallow : apex rounded : skin medium thick, smooth, lemon chrome : dots small, close, flush with the surface : flesh soft, fibreless, light cadmium : flavour mildly pleasant : taste moderately sweet : juice scanty.

*Stone* : Oblong oval : covered all over with short and soft fibre : veins forked and prominently raised.

*Fruit quality* : Medium : bearing heavy, late season : moderately resistant to hoppers and winds : keeping and peeling qualities medium.



KOLANKA GOVA



KOTHAPALLI KOBARI

KOTHAPALLI KOBARI

(This is a variety of the East Godavary district of Andhra State. In recent years it has gained great popularity among lovers of juicy mangoes in the Northern Circar districts. The fruit is unsuitable for table purposes as it is very fibrous and cannot be sliced easily. The variety owes its origin to a superior chance-seedling tree in Kothapalli village, a few miles away from Pithapuram in East Godavary district.)

*Tree* : Large, vigorous, spreading, productive, regular bearing ; top dome shaped ; trunk stocky ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves dark citrine, immature growing leaves citrine, turning rainette green.

*Inflorescence* : Large, broadly pyramidal, cosse green, moderately puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium, ovate to oblong oblique ; stalk inserted squarely ; cavity absent to slight ; ventral shoulder equal and higher than dorsal, ventral shoulder slightly rising and then rounded, dorsal shoulder ending in a moderate curve ; beak absent to a point ; sinus slight ; apex rounded to obliquely flattened ; skin medium thick, light chrome ; dots medium, moderately distant, flush with the surface ; flesh firm to soft, primuline yellow ; densely fibrous, fibres long and coarse ; flavour delightful ; taste very sweet ; juice plentiful.

*Stone* : Oblong oval ; covered with long and coarse fibre all over ; veins parallel and slightly depressed.

*Fruit quality* : Good ; bearing heavy, mid-season ; moderately resistant to winds and hoppers ; keeping-quality medium to fair.



### KOTHI HYDERABAD

The variety was selected for study from Saharanpur in Uttar Pradesh. The history of its origin and distribution is not known. It is, however, believed that its first grafts were propagated from one of the courtyards of a bungalow in Hyderabad (Deccan) and planted in Saharanpur. The variety possesses mediocre fruit quality and does not, therefore, need further multiplication.

*Tree* : Medium, moderately vigorous, spreading, medium to productive, regular bearing ; top dome shaped ; trunk stocky ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, crinkled, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves medal bronze, immature growing leaves clove brown.

*Inflorescence* : Medium, conical, pansy purple, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Large, oblong sub-reniform, base slightly flattened and extended or lipped ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak prominent ; sinus shallow to deep ; apex rounded ; skin medium thick, smooth to rough, primuline yellow ; dots medium, moderately distant, submerged ; flesh firm to soft, fibreless, cadmium ; flavour mildly pleasant ; taste medium to sweet ; juice moderately abundant.

*Stone* : Medium, oblong sub-reniform ; covered with fairly dense, short and soft fibre all over ; veins parallel, slightly raised.

*Fruit quality* : Fair ; bearing mid-season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities medium.



KOTHI HYDERABAD



KUMARPAHAR

## KUMARPAHAR

The history of origin and distribution of this variety is not known. It is believed that in all likelihood it originated in Bihar as its cultivation is not noticed elsewhere. It is a mediocre variety and does not, therefore, deserve much popularisation.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky ; shoots medium to thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded, crinkled ; margins inclined to be twisted ; venation moderately prominent ; tip sub-acuminate to acuminate ; base acute ; emerging leaves ecru olive, immature growing leaves hellebore green turning saccardos umber.

*Inflorescence* : Medium to large, conical, orange citrine, moderately puberulent ; stamens unequal ; smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, obliquely oval ; base obliquely rounded to flattened, stalk inserted slightly obliquely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent to a point ; sinus absent ; apex broadly pointed ; skin thick, smooth, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh medium to soft, fibreless, cadmium yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered all over with dense, short and soft fibre ; veins forked ; slightly to prominently raised.

*Fruit quality* : Medium : bearing medium to heavy, late season ; fairly resistant to hoppers and winds ; keeping and peeling qualities poor.



KUANPAHARIA

The variety is indigenous to West Bengal. It is also known as *Kuanpahar*. The history of its origin and distribution is not known. It possesses mediocre fruit qualities, and does not, therefore, need further popularisation.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky ; shoots medium to thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded and crinkled ; margins entire to inclined to be twisted ; venation moderately prominent ; tip sub-acuminate to acuminate ; base acute ; emerging leaves ecru olive, immature growing leaves hellebor green turning saccardos umber.

*Inflorescence* : Medium to large, conical, orange citrine, moderately puberulent ; stamens unequal, smaller than pistil, and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, obliquely oval ; base obliquely rounded to flattened ; stalk inserted slightly obliquely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent to a point ; sinus slight ; apex broadly pointed ; skin thick, smooth, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh medium to soft, fibreless, cadmium yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with short, soft and sparse fibre all over ; veins forked and slightly to prominently raised.

*Fruit quality* : Medium ; bearing late season ; fairly resistant to hoppers and winds ; keeping and peeling qualities poor.



KUANPAHARIA



LAL MULGOA

## DESCRIPTION OF VARIETIES

### LAL MULGOA

The variety is indigenous to Hyderabad State. The history of its origin and distribution is not known. It possesses high fruit quality, and deserves to be planted in house gardens.

*Tree* : Medium to large, vigorous, upright to spreading, medium productive, regular bearing ; top rounded ; trunk stocky ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves medal bronze, immature growing leaves dresden brown.

*Inflorescence* : Large, conical, absinthe green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, roundish to ovate roundish ; base rounded to slightly flattened ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder rounded to ending in a moderate curve ; beak mammiform ; sinus shallow to deep ; apex rounded ; skin medium thick, smooth to rough, cadmium with a blush of coral red on the shoulders ; dots large and close, submerged ; flesh firm, fibreless, buffy yellow ; flavour pleasant to delightful ; taste very sweet ; juice scanty.

*Stone* : Medium, oblong oval ; covered with sparse, short and soft fibre all over and medium on the ventral edge.

*Fruit quality* : Good ; bearing mid-season ; fairly resistant to hoppers and winds ; peeling-quality medium.



## THE MANGO

### LAL PAIRI

The variety is indigenous to Bombay State. The history of its origin and distribution is not known. The fruit possesses mediocre qualities and does not deserve further popularisation.

*Tree* : Small, slow growing, spreading, medium productive, alternate bearing ; top rounded ; trunk slender ; shoots slender.

*Leaves* : Small, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly to strongly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves deep chrysolite green, immature growing leaves mignonette green turning ecru olive.

*Inflorescence* : Small, pyramidal, pompeian red, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Small to medium, ovate ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak mammiform ; sinus slight ; apex broadly rounded ; skin thin, smooth, primuline yellow with blush of jasper red on shoulders ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour mildly pleasant ; taste moderately sweet ; juice scanty to moderately abundant.

*Stone* : Small, oval ; covered with dense, medium and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium, bearing mid-season ; moderately resistant to hoppers and winds ; keeping-quality poor ; peeling-quality medium.



LAL PAIRI



LANGRA

## DESCRIPTION OF VARIETIES

### LANGRA

There are three versions extant regarding the origin of this variety. It is, therefore, not possible to conjecture correctly about its origin. It is, however, certain that the variety owes its origin to a superior chance-seedling which formed the chief source of its dissemination. According to one report, the variety is said to have arisen as a chance-seedling in the backyard of the house of a *fakir* in Benares who suffered from partial lameness or deformity in one of his legs ; and the variety was named 'Langra' meaning lame. According to the second version, the mother tree of this variety is said to have been partially destroyed by a great storm that swept over Benares with the result that branches of one portion were completely destroyed, thus presenting a lame appearance. The third report about the origin of the name of this variety is that the mother tree first originated in a village named 'Langda' near Benares. 'Langra' is said to be a corruption of 'Langda'.

*Tree* : Medium, moderately vigorous, spreading, productive, tending to be rather irregular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves orange citrine, immature growing leaves ecru olive turning olive lake.

*Inflorescence* : Medium, conical, peach red, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium, ovate ; base rounded to slightly flattened ; stalk inserted squarely, cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder rounded to ending in a moderate curve ; beak slight but distinct ; sinus slight to absent ; apex rounded ; skin medium thick, smooth, lettuce green ; dots medium, distant, flush with the surface ; flesh firm to soft, fibreless, lemon yellow ; flavour strong, pleasant ; taste very sweet ; juice moderately abundant.

*Stone* : Medium, flattened, oval ; covered with fairly dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Very good, bearing heavy ; early to mid-season ; moderately resistant to hoppers and winds ; keeping-quality medium ; peeling-quality good.



## LANGRA LARGE

The history of origin and distribution of this variety is not known. Its name is apparently derived from its being similar to the *Langra* variety in most respects excepting the size. Its distribution is confined to certain parts of Uttar Pradesh at present. The variety deserves to be planted as one of the choice varieties in house gardens.

*Tree* : Medium, moderately vigorous to slow growing, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots thick.

*Leaves* : Large, spreading, slightly reflexed on the mid-rib, oval lanceolate, crinkled and slightly folded ; margins entire to twisted ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves buffy citrine, immature growing leaves orange citrine turning medal bronze.

*Inflorescence* : Large, conical : cocoa brown, sparsely puberulent : stamens equal and oblique to pistil : staminodes poorly developed.

*Fruit* : Medium to large, oval to oblong oval, base rounded ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak slightly prominent ; sinus absent ; apex rounded ; skin thick, smooth to rough, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm, sparingly fibrous, capucine yellow ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oblong ; covered with fairly dense, short and soft fibre all over ; veins parallel and slightly depressed.

*Fruit quality* : Good ; bearing medium, late season ; moderately resistant to hoppers and fairly resistant to winds ; keeping-quality good ; peeling-quality poor.



LANGRA LARGE



LASHIKARSHIKAN

LASHKARSHIKAN

The variety is indigenous to West Bengal State. Little is known about its origin and distribution. It is, however, presumed that the first grafts of this variety planted in Rais Mirza Bagan in Murshidabad must have formed the chief source of its distribution in West Bengal. The variety is of mediocre merit.

*Tree* : Medium to large ; moderate to vigorous, spreading, medium to productive, regular bearing ; top rounded ; trunk stocky ; shoots thick.

*Leaves* : Large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat to inclined to be crinkled ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves light brownish olive, immature growing leaves buffy citrine turning citrine.

*Inflorescence* : Medium, conical, lettuce green, densely puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong to oblong oblique ; base rounded to obliquely rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak mammiform ; sinus slight to shallow ; apex rounded ; skin medium thick, smooth, primuline yellow ; dots small, close, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong oval to oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing medium and mid-season ; moderately resistant to hoppers and winds ; keeping-quality medium ; peeling-quality medium to poor.



## THE MANGO

### LATA

The variety is indigenous to Ratnagiri in Bombay State. The history of its origin and distribution is not known. It is of mediocre quality and does not need popularisation.

*Tree* : Small, slow growing, spreading, medium productive, regular bearing ; top rounded ; trunk and shoots slender.

*Leaves* : Small, spreading, slightly reflexed on the mid-rib, elliptic lanceolate, flat ; margins entire, inclined to be wavy ; venation obscure ; tip sub-acuminate ; base acute ; emerging leaves forest green, immature growing leaves medal bronze turning ecru green.

*Inflorescence* : Small, conical, rose dore, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Small, roundish to roundish oblique ; base rounded to obliquely flattened ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak absent to a point ; sinus a point to missing ; apex rounded ; skin medium to thick, smooth, capucine yellow with a blush of corinthian red on shoulders ; dots medium and close, flush with the surface ; flesh firm, sparingly fibrous, primuline yellow ; flavour mildly pleasant ; taste moderately sweet to insipid ; juice moderately abundant.

*Stone* : Small, oval ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and prominently raised.

*Fruit quality* : Medium ; bearing late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



LATA



LATEEF ALIWALA

LATEEF ALIWALA

The variety had its origin in Amroha village of Moradabad district of Uttar Pradesh. It is reported to have originated as a chance-seedling in the orchards of Lateef Ali from where it has spread, in recent years, to other parts of Uttar Pradesh.

*Tree* : Medium, moderately vigorous, spreading, very productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute emerging leaves antique brown, immature growing leaves isabella colour turning dresden brown.

*Inflorescence* : Medium, conical, pomegranate purple, moderately puberulent ; stamens smaller than pistil and oblique to it, staminodes poorly developed.

*Fruit* : Medium to large ; oblong to oblong oblique ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders equal and level, both ending in a long curve ; beak absent to a point ; sinus absent to slight ; apex rounded to broadly pointed ; skin medium thick, rough, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh soft, fibreless, apricot yellow ; flavour mildly pleasant with traces of turpentine ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with sparse, short and soft fibre all over ; veins forked and prominently raised.

*Fruit quality* : Medium to good ; bearing heavy, mid to late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



LATRA

The variety was studied from the Government Fruit Research Station, Sabour, in Bihar. Little is known about its history.

*Tree* : Small to medium, moderately vigorous, drooping, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Small to medium, erect, slightly reflexed on the mid-rib, elliptic lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging, growing and mature leaves cosse green.

*Inflorescence* : Large, conical, bistre green, sparsely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Small, roundish ; base rounded ; cavity shallow ; shoulders equal and level, ventral rounded, dorsal shoulder ending in a moderate curve ; beak absent ; sinus slight ; apex flattened to broadly rounded ; skin thin, smooth, empire yellow with a blush of deep chrome on the shoulders ; dots medium and distant, flush with the surface ; flesh firm, moderately fibrous, apricot yellow ; flavour mildly pleasant ; taste moderately sweet ; juice abundant.

*Stone* : Small, oval, fibrous ; fibres medium and soft, covered all over and large on the ventral edge ; veins parallel and forked and slightly raised.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



LATRA



MACHLI

## MACHLI

The variety was selected for study from Saharanpur. It is also known as *Nastota* and *Aman Ford*. The history of its origin and distribution is not known. It possesses mediocre fruit qualities and does not, therefore, need popularisation.)

*Tree* : Small to medium, moderately vigorous, spreading, medium productive, irregular bearing ; top rounded ; trunk stocky ; shoots slender.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat to slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves pinard yellow, immature growing leaves lime green.

*Inflorescence* : Medium, pyramidal, buffy citrine, sparsely puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium to large, oblong ; base rounded and extended ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, ending in a moderate curve, dorsal shoulder ending in a long curve ; beak prominent to mammiform ; sinus shallow ; apex broadly rounded to flattened ; skin thick, smooth, capucine yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, primuline yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Oblong ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium, bearing mid-season, moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



## MALDA HANDLE

The variety is fairly popular in the Saharanpur area of Uttar Pradesh, and in Karnal district of the Punjab. The history of its origin and distribution is not known. It resembles the *Malda* variety of the Punjab which is known as *Bombay Green* in Uttar Pradesh. It is cultivated on a fairly extensive scale as a commercial variety.

*Tree* : Medium, moderately vigorous, spreading, medium to productive, regular bearing ; top rounded ; trunk medium to slender ; shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval, lanceolate, flat to slightly folded ; margins entire to inclined to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging, immature growing and mature leaves isabella colour.

*Inflorescence* : Medium to large, conical, acajou red, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity shallow ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak absent ; sinus absent ; apex broadly pointed ; skin medium thick, smooth, empire yellow ; dots medium and moderately distant, flush with the surface ; flesh soft, sparingly fibrous, light cadmium ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium to large, oblong oval ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



MALDA HANDLE



MANDRAGI

MANDRAGI

This variety from Saharanpur was recently introduced in the Gurdaspur Agricultural Farm in the Punjab. It does not possess fruit qualities which commend it for further popularisation. The history of its origin and distribution is not known.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky to medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging and immature growing leaves cosse green.

*Inflorescence* : Small to medium, conical, acajou red, moderately puberulent ; stamens smaller than and oblique to pistil ; staminodes moderately developed.

*Fruit* : Large, oblong, sub-reniform ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal and level, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent to a point ; sinus slight to shallow ; apex broadly pointed to rounded ; skin thick, rough to inclined to be warty, lettuce green ; dots large, moderately distant, submerged ; flesh firm, fibreless, apricot yellow ; flavour pleasant ; taste sweet ; juice scanty.

*Stone* : Large, oblong oval ; covered with dense, short and soft fibre all over ; veins parallel to forked, slightly depressed.

*Fruit quality* : Medium to good ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



## MANKURAD

The variety is of commercial importance in Vingurla and Malvan of Ratnagiri district in Bombay State from where it has spread to some extent in the North Kanara district of the State and also to Portuguese Goa. It possesses good fruit qualities and deserves to be introduced in drier regions of the Deccan and Northern India. The only defect of this variety is that in rainy weather it develops black spots on the skin very easily when it reaches the stage of ripening. This has restricted its spread in large measure. The fact that the tract where it is cultivated is unconnected by rail has also checked its spread.

*Tree* : Large, vigorous to moderately vigorous, spreading ; productive, alternate bearing ; top rounded ; trunk stocky ; shoots medium thick.

*Leaf* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation obscure ; tip sub-acuminate ; base acute ; emerging leaves sulphine yellow, immature growing leaves lettuce green turning mineral green.

*Inflorescence* : Medium, conical, absinthe green, moderately puberulent ; stamens smaller than pistil and oblique to it, staminodes poorly developed.

*Fruit* : Medium, ovate ; base slightly flattened ; stalk inserted squarely ; cavity absent to slight ; shoulders unequal, ventral slightly higher and broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak slight to distinct ; sinus slight ; apex rounded ; skin medium to thick, smooth, empire yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour pleasant to delightful ; taste very sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oval ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly raised.

*Fruit quality* : Very good ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping-quality poor to medium ; peeling-quality medium.



MANKURAD



MANORANJAN

## MANORANJAN

The variety comes from Madras State. It is cultivated on a limited scale in the Cuddapah and Chittoor districts of Andhra State also. It has no special features that may commend it for wider popularisation. The only good feature of the fruit is that it has exceedingly long keeping-quality. After long storage, however, it becomes bitter in taste though there are no visible signs of deterioration. Little is known about its origin. It may serve, perhaps, as a useful parent for evolving hybrid varieties with better storage qualities.

*Tree* : Small to medium, moderately vigorous, spreading, medium productive ; top rounded ; trunk medium to slender ; shoots medium thick.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, strongly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves hellebore green, immature growing leaves orange citrine turning citrine.

*Inflorescence* : Small, pyramidal, walnut brown, densely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight to shallow ; ventral shoulder equal to and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak mammiform ; sinus slight to shallow ; apex rounded ; skin medium thick, leathery, capucine yellow ; dots small and close, submerged ; flesh firm to hard, fibreless, deep chrome ; flavour mildly pleasant ; taste medium to sweet ; juice scanty.

*Stone* : Oblong oval ; covered with short and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Medium ; bearing medium to poor, mid to late season ; resistant to winds but highly susceptible to hoppers ; keeping-quality very good ; peeling-quality medium.



MARKEARA

The variety is believed to have originated as a superior chance-seedling in Fatehpur district of Uttar Pradesh. It is also known as *Ananas Fatehpuri*. It derives its name from the high fruit quality which it possesses—‘Markeara’ meaning the peerless one.

*Tree* : Medium, moderately vigorous, spreading, very productive, regular bearing ; top rounded ; trunk medium to stocky ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire, inclined to be wavy and twisted ; venation obscure to moderate ; tip sub-acuminate ; base rounded ; emerging leaves acajou red, immature growing leaves corinthian red.

*Inflorescence* : Large, pyramidal, ochre red, moderately puberulent, stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity shallow ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak distinct ; slightly prominent ; sinus absent to slight ; apex broadly pointed ; skin thick, rough, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh firm to soft, sparingly fibrous, baryta yellow ; flavour pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oval ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium to good ; bearing heavy, mid to late season ; moderately resistant to hoppers ; highly resistant to winds ; keeping and peeling qualities medium.



MARKEARA



MEWA FAJRI

## MEWA FAJRI

The variety derives its name from 'Mewa', meaning resins (dry grapes) and 'Fajri', one of the commercial varieties of mango. As it is smaller than the 'Fajri' variety, it is known as *Mewa Fajri* to differentiate it from the latter. Its cultivation is at present limited to Uttar Pradesh. The variety is of mediocre merit.)

*Tree* : Medium, moderately vigorous, spreading, medium to productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leave ecru green, immature growing leaves saccardos umber turning dresden brown.

*Inflorescence* : Medium, conical, light coral red, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong, obliquely flattened ; stalk inserted obliquely ; cavity slight to shallow ; shoulders unequal ; ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent to a point ; sinus slight to shallow ; apex rounded to broadly pointed ; skin medium thick, smooth, pinnard yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, empire yellow ; flavour pleasant ; taste moderately sweet ; juice moderate to abundant.

*Stone* : Medium, oblong ; covered with fairly dense, short and soft fibre all over ; veins parallel and slightly depressed.

*Fruit quality* : Medium ; bearing early ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



## THE MANGO

### MAHMUDA

The variety is indigenous to Hyderabad State. The history of its origin and distribution is not known. It possesses mediocre fruit qualities and does not deserve further popularisation.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing : top rounded : trunk medium : shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded : margins entire : venation moderately prominent : tip sub-acuminate : base acute : emerging leaves ecru olive, immature growing leaves olive lake turning mignonette green.

*Inflorescence* : Medium, pyramidal, corinthian red, moderately puberulent stamens equal and oblique to pistil : staminodes poorly developed.

*Fruit* : Medium to large, broadly oval : base slightly flattened to rounded : stalk inserted squarely : cavity slight : shoulders equal, ventral shoulder rounded, dorsal shoulder ending in a long curve : beak absent to a point : sinus absent to slight : apex broadly pointed : skin thick, smooth, golden glow with a blush of coral red on shoulders : dots small, moderately distant, flush with the surface : flesh firm to soft, fibreless, light cadmium : flavour mildly pleasant : taste moderately sweet : juice moderately abundant.

*Stone* : Oblong to oblong oval : covered with short and soft fibre all over : veins forked and slightly depressed.

*Fruit quality* : Medium : bearing mid-season : fairly resistant to hoppers and winds : keeping and peeling qualities medium.



MAHMUDA



MOHANBHOOG

## DESCRIPTION OF VARIETIES

### MOHANBHOG

Little is known about the origin and distribution of this variety. It is, however, believed that it must have originated as a chance-seedling in Bihar from where it has spread to certain parts of Uttar Pradesh and Bengal. The variety is of medium quality and does not, therefore, deserve further popularisation.

*Tree* : Large, vigorous, spreading, medium productive, alternate bearing ; top rounded ; trunk stocky ; shoots medium to thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, crinkled and slightly folded ; margins wavy and twisted ; venation moderately prominent ; tip acute ; base acute ; emerging and immature growing leaves lettuce green.

*Inflorescence* : Small to medium, conical, tawny, moderately puberulent ; stamens equal and oblique to pistil ; staminodes moderately developed.

*Fruit* : Large, ovate to ovate oblique ; base slightly to obliquely flattened ; stalk inserted squarely ; cavity absent ; shoulders equal, ventral slightly higher than dorsal, ventral shoulder rounded ; dorsal shoulder ending in a moderate curve ; beak distinct ; sinus slight ; apex broadly rounded ; skin medium to thick, smooth to rough, pinard yellow ; dots small, moderately distant, flush with the surface ; flesh firm to soft, fibreless, wax yellow ; flavour pleasant to aromatic with trace of turpentine ; taste medium to sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oblong oval ; covered with fairly dense, short and soft fibre all over ; veins parallel, slightly to prominently raised.

*Fruit quality* : Medium, bearing medium and late season ; fairly resistant to hoppers and winds ; keeping and peeling qualities medium.



## THE MANGO

### MULGOA

This is a commercial variety of Southern India and the Deccan. The origin of this variety is not known. It is quite popular among the lovers of the mango owing to the high quality of its fruit. It forms an ideal variety for dessert, table and exhibition purposes. It was introduced in Tropical America a long time back. It has won wide popularity in Chittoor, Salem and Cuddapah districts and most of the districts of Hyderabad and Mysore States and the Karnatak district of Bombay State. Being a variety maturing late in the fruiting season, it is often adversely affected by the early south-west monsoon rains, especially in parts of Mysore where its popularity is decreasing rapidly. The fruit of this variety harvested during the rains on the West Coast is frequently found infested with mango-stone weevil, which makes inroads into the pulp, and is marked with black spots due to heavy rains, which detract considerably from its marketing value. In the drier tracts of Southern India which are free from heavy early south-west monsoon rains, the crop gives better results. The trees bloom profusely but the yields are disproportionately low and possess low percentage of hermaphrodite or perfect flowers in the panicle.

*Tree* : Small to medium, moderately vigorous to slow growing, spreading, unproductive, uncertain bearing ; top rounded ; trunk and shoots slender.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, elliptic lanceolate, slightly folded ; margins wavy ; venation moderate to prominent ; tip sub-acuminate ; base acute ; emerging leaves orange citrine, immature growing leaves madder brown turning morocco red.

*Inflorescence* : Medium, conical, pyrite yellow, densely puberulent, stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Large, roundish oblique ; base obliquely flattened ; stalk inserted squarely ; cavity shallow ; ventral shoulder equal and higher than dorsal, both shoulders rounded ; beak distinct ; sinus slight to absent ; apex rounded ; skin medium thick, primuline yellow ; dots medium, moderately distant, slightly submerged ; flesh firm, fibreless, mustard yellow ; flavour delightful ; taste very sweet ; juice moderate to abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Very good ; bearing poor, late season ; fairly susceptible to hoppers and winds ; keeping-quality good.



MULGOA



MUNDAPPA

## MUNDAPPA

This is a commercial variety indigenous to the South Kanara district of Madras State. It is of recent origin and has fast gained wide popularity in all the humid parts of the West Coast, e.g. South Kanara, Malabar, and Travancore-Cochin States, where it has seen its introduction in recent years. Although fruits of this variety mature late in the fruiting season, it withstands considerably the adverse effects of the early south-west monsoon. The variety is attractive, and of regular shape.

*Tree* : Large, vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire, twisted ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves ecru green, immature growing leaves dark citrine turning ecru green.

*Inflorescence* : Large, pyramidal, cocoa brown, moderately puberulent ; stamens smaller than pistil and parallel to it ; staminodes poorly developed.

*Fruit* : Medium to large, roundish ; base slightly flattened ; stalk inserted squarely ; cavity shallow ; shoulders equal, level and rounded ; peak and sinus absent ; apex rounded ; skin thin, deep chrome ; dots medium, slightly depressed, moderately distant ; flesh firm, fibreless, light cadmium ; flavour delightful ; taste sweet ; juice moderate to abundant.

*Stone* : Oblong oval ; covered with dense, short and coarse fibre all over and medium on the ventral edge ; veins forked and slightly raised.

*Fruit quality* : Good ; bearing heavy ; mid to late season ; resistant to winds and hoppers ; keeping-quality good.



## MURSHIDABAD

The variety is indigenous to Hyderabad State. The history of its origin and distribution is not known. The variety is fairly popular in Hyderabad State.

*Tree* : Small, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Small, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves olive lake, immature growing leaves buffy citrine turning citrine.

*Inflorescence* : Medium, pyramidal, ochraceous buff, moderately pubescent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, oblong ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak mammiform ; sinus slight to shallow ; apex rounded ; skin medium thick, rough and inclined to be warty, spinach green with a blush of coral red on shoulders ; dots medium and distant, submerged ; flesh firm, fibreless, cadmium yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Oblong ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium to good ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



MURSHIDABAD



MUSHRAD

MUSHRAD

The history of origin and distribution of this variety is not known. It is, however, believed to have originated as a superior chance-seedling in North Kanara district in Bombay State.

*Tree* : Medium, moderately vigorous, spreading, medium productive, alternate bearing ; top rounded ; trunk stocky ; shoots medium to thick.

*Leaves* : Medium, spreading, strongly reflexed on the mid-rib, oval lanceolate, flat, slightly to strongly folded ; margins entire, inclined to be wavy and twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves ecru green, immature growing leaves isabella colour.

*Inflorescence* : Medium, conical, olive ochre, sparsely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate : base slightly flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate to long curve ; beak slightly prominent ; sinus slight ; apex broadly pointed to rounded ; skin medium thick, smooth, cadmium with a blush of light coral red on shoulders ; dots medium, close, flush with the surface ; flesh firm, fibreless, apricot yellow ; flavour pleasant ; taste sweet to moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong oval ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins parallel and slightly depressed.

*Fruit quality* : Medium to good ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



## THE MANGO

### NASHPATI

The variety derives its name from the peculiar shape of its fruit which resembles pear known in Hindi as *Nashpati*. The history of its origin and distribution is not known. Its cultivation is confined, at present, to Uttar Pradesh.

*Tree* : Medium, moderately vigorous to slow growing, spreading, productive, inclined to be alternate bearing ; top rounded ; trunk slender ; shoots slender.

*Leaves* : Medium to small, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat to slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves ecru olive, immature growing leaves buffy citrine.

*Inflorescence* : Medium, conical, rainette green, moderately puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium to small, roundish oblique ; base obliquely flattened ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder rounded to ending in a moderate curve ; beak a point ; sinus absent to slight ; apex rounded ; skin thin to medium thick, smooth, primuline yellow ; dots small, close, flush with the surface ; flesh firm, fibreless, pinnard yellow ; flavour pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium to small, oval ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium, bearing late season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities good.



NASHPATI



NAZEEM PASAND

## DESCRIPTION OF VARIETIES

### NAZEEM PASAND

This is a highly prized variety of the Visakhapatnam district in Andhra State. It was studied from a private orchard at Alamnada. It is also called by the name *Nazeemkhanpasand*. The history of the variety is not known.

*Tree* : Medium ; top rounded ; shoots medium thick.

*Leaves* : Out-held, slightly reflexed and folded with sub-acuminate tip ; emerging and immature growing leaves mignonette green.

*Inflorescence* : Large, geranium pink, densely puberulent ; stamens shorter than pistil and parallel to it ; staminodes poorly developed.

*Fruit* : Medium to large, roundish ; base rounded and extended ; stalk inserted squarely ; cavity absent ; ventral shoulder equal and level with dorsal, both shoulders rounded ; beak a point ; sinus absent ; apex rounded ; skin medium thick, empire yellow ; dots small, moderately distant ; flesh firm, fibreless, maize yellow ; flavour delightful ; taste very sweet ; moderately juicy.

*Stone* : Oblong oval ; covered with dense, short and soft fibre all over ; veins slightly forked and slightly to prominently raised.

*Fruit quality* : Very good ; bearing medium to poor, late season ; susceptible to hoppers but resistant to winds ; keeping-quality good.



## THE MANGO

### NAZUK PASAND

The variety is indigenous to certain districts of Andhra State. The history of its origin is not known. It is found cultivated in some districts of Madras State as well. The variety is well suited for canning purposes. It does not have fruit qualities which would justify wider distribution. The only notable feature of the variety is its highly ornamental appearance, having a thick and bushy top with narrow leaves, and may prove useful for avenue planting. It is also known as *Nazuk Badan* in Hyderabad State.

*Tree* : Small, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium, shoots slender.

*Leaves* : Small, erect, slightly to strongly reflexed on the mid-rib, elliptic lanceolate, strongly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves lime green, immature growing leaves tawny olive.

*Inflorescence* : Medium, conical, saccardos umber, sparsely puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium, oval ; base rounded and extended ; stalk inserted squarely ; cavity absent ; ventral shoulder broader than dorsal and level with it, ventral shoulder rounded, dorsal shoulder sloping ; beak a point to missing ; sinus absent ; apex broadly pointed ; skin medium thick, primuline yellow ; dots medium and close, flush with surface ; flesh soft, fibreless, primuline yellow ; juice abundant.

*Stone* : Oblong ; covered with short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium to good ; bearing heavy, mid-season ; moderately resistant to winds and susceptible to hoppers ; keeping-quality medium to fair.



NAZUK PASAND



NEELUM

## NEELUM

This is a commercial variety indigenous to Madras State from where it has been introduced into other provinces. The history of its origin is not known. It has been found widely distributed in almost all the drier districts of Madras and Hyderabad States where it is gaining wide popularity. It forms the principal commercial variety of the Chittoor and Cuddapah districts of Andhra State. It is an ideal variety, suitable for long distance transport owing to its high keeping-quality, and is imported even by the distant northern markets like Delhi. It is a very desirable commercial type deserving wider introduction into all the dry regions of the country.

The variety frequently bears two crops, one in June and the other in September-October. Its name is apparently derived from the dark green colour of the immature fruit—'Neelum' meaning blue in most of the South Indian languages. It is also known under the name of *Kaja Laddu* in some of the southern districts of Madras State.

*Tree* : Medium, moderately vigorous, spreading ; productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately to prominent ; tip acute ; base acute ; emerging leaves orange citrine, immature growing leaves diamine brown turning verona brown.

*Inflorescence* : Medium, conical, oil green, sparsely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely and slightly extended, flattened ; stalk inserted squarely ; cavity slight to absent ; ventral shoulder broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder sloping to ending in a long curve ; beak a point, sinus shallow ; apex rounded ; skin medium thick, saffron yellow ; dots medium, moderately distant, slightly submerged ; flesh fibreless, primuline yellow ; flavour delightful ; taste sweet ; juice moderately abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over ; veins slightly forked and raised.

*Fruit quality* : Good ; bearing heavy, often late, sometimes twice a year, with a sparse to moderate off-season crop ; moderately resistant to winds and hoppers ; keeping-quality very good.



## NISAR PASAND

This variety was selected for study from Malihabad in Uttar Pradesh. The history of its origin and distribution is not known. It possesses very high fruit qualities and deserves wider popularisation. The fruit also possesses excellent keeping-qualities.

*Tree* : Medium, moderately vigorous, spreading, very productive, regular bearing : top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation obscure to moderately prominent ; tip acute ; base acute ; emerging leaves olive, immature growing leaves ecru green turning olive lake.

*Inflorescence* : Medium, pyramidal, oil green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong oblique to obliquely oval ; base obliquely flattened ; stalk inserted obliquely ; cavity slight to absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight to shallow ; apex rounded ; skin medium to thick, rough, capucine yellow ; dots medium, close, flush with the surface ; flesh firm, fibreless, light cadmium ; flavour pleasant ; taste sweet ; juice scanty.

*Stone* : Medium, oblong oval, covered with fairly dense, short and soft fibre all over ; veins slightly forked and depressed.

*Fruit quality* : Very good ; bearing heavy and mid-season ; moderately resistant to winds and hoppers ; keeping-quality good ; peeling-quality very good.



NISAR PASAND



OLOUR

## OLOUR

This is a popular polyembryonic variety of the Malabar district in Madras State. Its history of origin and distribution is not known. The fruit, although not possessing high qualities, is popular as it is the first to come into the market—as early as February and March. It is exported even to distant North Indian markets for the same reason. Owing to the thick skin it possesses it has medium to good storage quality.

*Tree* : Medium, vigorous, upright, productive, regular bearing ; top oval, trunk stocky to medium ; shoots thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves buffy citrine, immature growing leaves citrine.

*Inflorescence* : Large, conical, amber brown, moderately puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium, oval ; base rounded ; stalk inserted squarely ; cavity absent ; ventral shoulder broader than and level with dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak a point ; apex broadly pointed ; sinus slight ; skin thick capucine yellow ; dots large, distant and submerged ; flesh soft, moderately fibrous ; fibres medium and soft, capucine yellow ; flavour aromatic with slight indication of turpentine ; taste medium sweet to insipid ; juice moderate to abundant.

*Stone* : Oblong oval ; covered with medium, and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium to poor ; bearing heavy, very early ; moderately resistant to winds and hoppers ; keeping-quality medium to good.



## PADIRI

This is a famous variety of the southern Tamil districts of Madras State. It owes its origin to a superior chance-seedling planted by one of the clergymen in Mayavaram in Tanjore district of Madras State.

The fruit is very attractive, often bearing a blush of bright red colour on the shoulders against the background of orange-yellow colour of the skin. The variety owes its popularity to the strong and delightful fragrance of the fruit when ripe. It has gained popularity in many districts of Madras State in recent years.

*Tree* : Medium, moderately vigorous, spreading, productive : top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded : margins entire : venation moderately prominent ; tip acuminate : base acute : emerging leaves hellebore, immature growing leaves medal bronze turning isabella colour.

*Inflorescence* : Medium, pyramidal, scarlet red, densely puberulent : stamens equal and parallel to pistil : staminodes well developed.

*Fruit* : Medium, oblong, base rounded ; stalk inserted squarely : cavity absent : shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve : beak distinct : sinus shallow to slight, apex rounded : skin medium thick, leathery, cadmium yellow with a blush of coral red on shoulders : dots small and close, slightly submerged : flesh firm, fibreless, light cadmium : flavour delightful : taste very sweet : juice abundant.

*Stone* : Oblong : covered with short and soft fibre all over : veins forked and slightly to prominently raised.

*Fruit quality* : Good to best : bearing medium to heavy, mid-season moderately susceptible to hoppers and winds : keeping-quality good.



PADIRI



PAIPOSHA

## PAIPOSHA

The variety is indigenous to Bombay State. The history of its origin and distribution is not known. It was selected from the Government Fruit Experiment Station at Kirkee for study. It does not possess any special features justifying wider distribution.

*Tree* : Medium, moderately vigorous, spreading, medium to productive, regular bearing ; top rounded ; trunk medium ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire to inclined to be wavy ; venation moderately prominent ; tip acute ; base acute ; emerging leaves isabella colour, immature growing leaves cinnamon brown turning buffy citrine.

*Inflorescence* : Medium, pyramidal, empire yellow, moderately pubescent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Large, oblong oval to oblong ; base rounded to obliquely rounded ; stalk inserted squarely ; cavity absent ; shoulders equal, ventral slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak a point to distinct ; sinus slight to absent ; apex rounded ; skin thick, smooth, primuline yellow ; dots large, distant, flush with the surface ; flesh firm, fibreless, lemon chrome ; flavour mildly pleasant ; taste moderately sweet to insipid ; juice scanty to moderately abundant.

*Stone* : Large, oblong ; covered with fairly dense, short and soft fibre all over ; veins parallel, slightly to prominently raised.

*Fruit quality* : Medium, bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



## THE MANGO

### PAIRI

This commercial variety is native to Bombay State. It has been introduced into tropical America where it has gained popularity. It appears to be especially adapted to the humid coastal climate of Western India and is a very popular variety in the States of Madras, Bombay, Mysore, Hyderabad, and Travancore-Cochin. The fruit is very attractive with a blush of deep crimson red on shoulders against a background of deep orange-yellow colour of the skin. The variety has not gained as much popularity as the *Alphonso* variety, as it lacks the good keeping-quality of the latter. Little is known about its origin and distribution. It is called by different names in different mango growing tracts. In the southern Tamil districts of Madras it is known as *Grape* ; in the central Tamil districts it is known as *Nadusalai* or *Natasalai* ; in Mysore it goes under the name of *Raspuri*. In Hyderabad State it is known as *Goha Bunder*, probably a corruption of 'Goa Bunder', for it is believed to be a native of Portuguese Goa ; in the Circar districts of Madras State it is known as *Yerra Goa*. In some districts of the Andhra State it is called *Peter* or *Peterpasand*.

*Tree* : Large, vigorous, spreading, productive, regular to alternate bearing ; top dome shaped ; trunk stocky ; shoots medium thick.

*Leaves* : Medium to large ; spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly to strongly folded, crinkled and twisted ; margins entire ; emerging leaves mignonette green, immature growing leaves ecru olive turning citrine.

*Inflorescence* : Medium to large, pyramidal, absinthe green, moderately puberulent ; stamens longer than pistil and parallel to it ; staminodes well developed.

*Fruit* : Medium, ovate ; base slightly to obliquely flattened ; stalk inserted squarely ; cavity slight ; ventral shoulder broader and higher than dorsal, ventral shoulder slightly rising and then rounded, dorsal shoulder ending in a moderate curve ; beak broadly mammiform ; sinus slight ; apex rounded ; skin medium to thick, leathery, apricot ; dots small, closed, submerged ; flesh soft, fibreless, primuline yellow ; flavour good ; taste very sweet ; juice abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over ; veins forked and grooved.

*Fruit quality* : Good ; bearing heavy and early ; moderately resistant to hoppers and winds ; keeping-quality medium to poor.



PAIRI



PANAKALU

## PANAKALU

The variety is indigenous to the Visakhapatnam district of Andhra State. The history of its origin and distribution is not known. It is a juicy variety very much liked by lovers of juicy mangoes. The fruit ripens early in the season and fetches relatively better returns than other varieties in the tract. It is slowly gaining popularity on account of this.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves mineral green, immature growing leaves ecru green turning old gold.

*Inflorescence* : Medium, conical, viridine green, densely puberulent ; stamens shorter than pistil and parallel to it ; staminodes well developed.

*Fruit* : Medium, oblong oblique ; base obliquely flattened ; stalk inserted squarely ; cavity shallow ; ventral shoulder equal and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak distinct ; sinus slight to shallow ; apex rounded ; skin medium thick, leathery, deep chrome ; dots medium, close ; flesh firm, capucine yellow ; moderately fibrous ; fibres long and soft ; flavour delightful ; taste sweet ; juice fairly plentiful.

*Stone* : Oblong ; covered with long and soft fibre all over ; veins slightly forked and raised.

*Fruit quality* : Good ; bearing heavy, very early ; moderately resistant to winds and hoppers ; keeping-quality medium.



## PANCHADARAKALASA

This variety owes its origin to the East Godavary district of Andhra State. The name is derived from the Telugu words 'Panchadara', meaning sugar, and 'Kalasa', meaning a pot. The variety is fairly popular as a juicy type and has rapidly spread in recent years in many districts of Madras State. The history of its origin and distribution is not known.

*Tree* : Large, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; venation moderately prominent ; tip acute ; emerging leaves rainette green, immature growing leaves hellebore green.

*Inflorescence* : Medium, pyramidal, saccardos umber ; moderately puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium, ovate ; base slightly flattened to rounded ; stalk inserted squarely ; cavity absent ; ventral shoulder equal and level with dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak distinct ; sinus slight to absent ; apex rounded ; skin medium thick, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh soft, light cadmium ; fibrous, fibres medium and soft ; flavour delightful ; taste very sweet ; juice fairly plentiful.

*Stone* : Oblong oval ; covered with medium and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing heavy, mid-season ; moderately resistant to hoppers and winds ; keeping-quality medium.



PANCHADARAKALASA



PANCHAVARNAM

PANCHAVARNAM

This variety was studied from the Mango Varietal Collection Block at the Government Fruit Research Station, Kodur, Andhra State. The history and origin of this variety is not known. It is a mediocre variety, and seems to have originated as a superior chance-seedling in certain districts of Andhra State.

*Tree* : Medium ; top rounded ; shoots medium thick.

*Leaves* : Out-held, slightly reflexed and folded, with sub-acuminate tip ; emerging leaves ecru olive, immature growing leaves diamine brown turning citrine.

*Inflorescence* : Medium, diamine brown, densely puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium, roundish ; base slightly flattened ; stalk inserted squarely ; cavity shallow ; shoulders equal, level and rounded ; beak distinct ; sinus absent ; apex rounded ; skin medium thick, ta-ming ; dots small, distant ; flesh firm, fibreless, light cadmium ; flavour delightful ; taste very sweet ; juice moderate to abundant.

*Stone* : Medium, oblong oval, covered with short and soft fibre all over ; veins slightly forked and raised.

*Fruit quality* : Good ; bearing mid to late season ; fairly susceptible to hoppers and winds ; keeping-quality good.



PANJA PASAND

The variety is reported to have spread from its grafts planted in Rais Mirza Bagan orchards in Murshidabad in West Bengal. Further than that its history is not known. It is a suitable variety for commercial planting.

*Tree* : Medium, moderately vigorous, spreading, medium to productive, regular bearing : top rounded : trunk medium : shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly crinkled and folded : margins entire : venation moderately prominent : tip acute : base acute : emerging leaves grape green, growing leaves grape green turning lumiere green.

*Inflorescence* : Medium, pyramidal, lumiere green : moderately puberulent : stamens equal and oblique to pistil : staminodes poorly developed.

*Fruit* : Medium, ovate oblong : base slightly flattened to rounded, stalk inserted squarely : cavity absent : shoulders unequal and level, ventral shoulder broader than dorsal and rounded, dorsal shoulder ending in a long curve : beak absent : sinus slight : apex rounded : skin thin, smooth, golden yellow : dots small, moderately distant, flush with the surface : flesh firm to soft, fibreless, primuline yellow : flavour pleasant with traces of turpentine ; taste sweet ; juice moderate to abundant.

*Stone* : Medium, oblong : covered with dense, short and coarse fibre all over and medium on the ventral edge : veins parallel to forked and slightly depressed.

*Fruit quality* : Good : bearing heavy and early : fairly resistant to hoppers and winds : keeping-quality good : peeling-quality medium.



PANJA PASAND



PANSERA

## PANSERA

This variety derives its name from the large size of its fruits which often weigh about five seers each. The history of its origin and distribution is not known. It possesses mediocre fruit qualities and does not deserve further popularisation.

*Tree* : Medium, moderately vigorous ; spreading, productive, regular bearing ; top rounded ; trunk medium, shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, inclined to be crinkled and slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves cinnamon brown, immature growing leaves orange citrine.

*Inflorescence* : Medium, pyramidal, corinthian red, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Large, oval-oblong ; base rounded and slightly lipped or extended ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long to moderate curve ; beak absent to a point ; sinus slight to shallow ; apex rounded to broadly pointed ; skin medium thick, smooth to rough, deep chrysolite green ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, yellow ochre ; flavour pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over ; veins parallel, slightly to prominently raised.

*Fruit quality* : Fair ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



### PEDDAKALEPADU

This variety comes from Andhra State. The exact history of its origin and distribution is not known. It possesses very high fruit quality and bearing propensities. The only feature that has, perhaps, prevented its wider popularity is its susceptibility to hoppers and sooty mould.

*Tree* : Small to medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute to rounded ; emerging leaves ecru olive, immature growing leaves orange citrine turning prout's brown.

*Inflorescence* : Medium, broadly pyramidal, coral pink, moderately puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium to large, oblong ; base broadly pointed to necked ; stalk inserted squarely ; cavity absent to slight ; shoulders equal and level, ventral shoulder rounded to ending in a long curve, dorsal shoulder ending in a long curve ; beak mammiform ; sinus slight to shallow ; apex rounded ; skin medium thick, leathery, golden glow ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour delightful ; taste very sweet ; juice moderate to abundant.

*Stone* : Oblong ; covered with short and soft fibre all over ; veins forked, slightly to prominently raised.

*Fruit quality* : Good ; bearing medium to heavy, mid-season ; moderately resistant to winds and hoppers ; keeping-quality good.



PEDDAKALEPADU



PEDDA NEELUM

## PEDDA NEELUM

The variety is native to certain districts of Andhra State. The history of its origin is not known. It was first propagated from a grafted tree by the Fruit Research Station, Kodur, from the orchards of Late Sri P. V. Chandal Reddy of Kodur and planted in the Variety Collection Block of the Station which has formed in recent years the chief source of its dissemination. It does not possess any special features to justify its wider popularisation and distribution.

*Tree* : Medium, moderately vigorous, spreading, medium productive : top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves citrine, immature growing leaves isabella colour.

*Inflorescence* : Medium, pyramidal, ecru olive, sparsely puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium, oblong reniform ; base rounded ; stalk inserted obliquely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak mammiform ; sinus deep ; apex rounded ; skin medium thick, orange peel ; dots medium, moderately distant, slightly submerged ; flesh firm, fibreless, cadmium yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Oblong ; covered with short and soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Medium ; bearing medium, mid-season ; moderately resistant to winds and hoppers ; keeping-quality good.



## THE MANGO

### PEDDA RASAM

The variety is largely grown in Krishna and Godavary districts of Andhra State. Its fruit is valued highly by mango lovers of this region. The variety is, however, not popular in other districts of the State owing to the abundant fibre it possesses. It deserves to be cultivated by lovers of juicy varieties.

*Tree* : Medium, moderately vigorous, upright to spreading, medium productive, regular bearing : top rounded to vase form : trunk medium : shoots medium thick.

*Leaves* : Medium, upheld to spreading, strongly reflexed on the mid-rib and folded : emerging leaves orange citrine, immature growing leaves prout's brown turning ecru green.

*Inflorescence* : Medium, dresden brown, moderately puberulent : stamens equal and parallel to pistil : staminodes well developed.

*Fruit* : Large, oblong : base rounded : stalk inserted squarely : cavity none : shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve : beak mammiform : sinus shallow : apex rounded to broadly pointed : skin medium thick, leathery, primuline yellow : dots medium and close : flesh soft, capucine yellow, densely fibrous : fibres abundant, medium to long and coarse : flavour pleasant : taste sweet : juice plentiful.

*Stone* : Oblong, covered with medium to long and coarse fibre all over : veins parallel and slightly depressed.

*Fruit quality* : Good : bearing medium, mid-season : moderately resistant to winds and hoppers ; keeping-quality good.



PEDDA RASAM



POTE

## DESCRIPTION OF VARIETIES

### POTE

The variety was selected for study from the Fruit Experiment Station, Kirkee, Poona. The history of its origin and distribution is not known. Being of very mediocre quality, it deserves very limited cultivation.

*Tree* : Medium to large, moderately vigorous, spreading, unproductive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins wavy and twisted ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves forest green, immature growing leaves medal bronze turning ecru green.

*Inflorescence* : Small to medium, pyramidal, tawny, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, roundish oblique, ovate ; base obliquely flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded. dorsal shoulder ending in a moderate curve ; beak prominent ; sinus absent ; apex rounded ; skin thick, rough, lettuce green ; dots small and close, flush with the surface ; flesh firm, fibreless, empire yellow ; flavour mildly pleasant ; taste medium sweet ; juice scanty to moderately abundant.

*Stone* : Medium, oblong oval ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



## THE MANGO

### PULIHORA

The variety originated in Andhra State. Its history is not known.

The variety is very attractive with a blush of bright red on shoulders on a background of orange-yellow colour of the skin. It is also known as *Colour* in the Tinnevely district of Madras State. The fruit is harvested fairly early in the fruiting season and, therefore, sells at a premium price. It is a very desirable variety for commercial planting.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top oval ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; twisted ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves orange citrine, immature growing leaves medal bronze, turning mineral green.

*Inflorescence* : Medium, pyramidal, spectrum red, densely puberulent ; stamens longer than pistil and parallel to it, staminodes well developed.

*Fruit* : Medium, ovate to ovate oblong ; base flattened ; stalk inserted squarely ; cavity slight ; ventral shoulder equal to and slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak distinct to mammiform ; sinus slight ; apex rounded ; skin medium thick, cadmium yellow with a blush of kaiser brown on shoulders ; dots medium, close, flush with the surface ; flesh soft, primuline yellow ; fibreless ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over and medium on the ventral edge ; veins forked and slightly raised.

*Fruit quality* : Medium to good ; bearing medium to heavy, early to mid-season ; fairly resistant to hoppers and winds ; keeping-quality medium.



PULIHORA



PUTHI

## PUTHI

The variety was selected for study from the Government Fruit Experiment Station, Kirkee, Poona. The history of its origin and distribution is not known. It does not possess sufficiently good fruit qualities to deserve wider popularisation.

*Tree* : Small to medium, moderately vigorous, spreading, unproductive, regular bearing ; top rounded ; trunk medium ; shoots medium thick to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves isabella colour, immature growing leaves saccardos umber turning buffy citrine.

*Inflorescence* : Medium, pyramidal, absinthe green, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, roundish to roundish oblique ; base flattened ; stalk inserted squarely ; cavity shallow to deep ; shoulders equal and level, ventral sometimes slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak broadly mammiform ; sinus absent to slight ; apex rounded ; skin thick, rough to warty, ecru olive yellow ; dots medium, moderately distant, submerged ; flesh firm, fibreless, primuline yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong oval ; covered with sparse, short and soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping-quality medium to good ; peeling-quality poor.



RAI BHOG

The variety is indigenous to Ratnagiri in Bombay State. The history of its origin and distribution is not known. It possesses mediocre qualities, and does not, therefore, need popularisation.

*Tree* : Medium, moderately vigorous, upright, medium productive, regular bearing : top rounded to vase form : trunk medium : shoots thick.

*Leaves* : Large, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded : margins entire, wavy, slightly twisted : venation moderately prominent : tip acuminate : base obtuse : emerging leaves isabella colour, immature growing leaves orange citrine turning ecru green.

*Inflorescence* : Large, pyramidal, ecru olive : moderately puberulent : stamens equal and oblique to pistil : staminodes poorly developed.

*Fruit* : Medium, ovate : base slightly to obliquely flattened : stalk inserted squarely : cavity absent : shoulders unequal, ventral slightly higher than dorsal and rounded, dorsal shoulder ending in a moderate curve : beak absent : sinus absent : apex rounded : skin thick, smooth, cadmium : dots medium, moderately distant, flush with the surface : flesh firm, fibreless, primuline yellow : flavour mildly pleasant : taste moderately sweet : juice scanty.

*Stone* : Medium, oblong oval : covered with short, fairly dense and soft fibre all over and medium on the ventral edge : veins forked and slightly depressed.

*Fruit quality* : Poor : bearing medium, early : moderately resistant to winds and hoppers : keeping and peeling qualities medium.



RAI BHOG



RAJAPURI

RAJAPURI

The variety is gaining considerable commercial importance in Gujerat owing to its capacity to bear regularly heavy crops. It rightly deserves to be introduced in other mango growing regions of the country also.

*Tree* : Medium, vigorous to moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat, inclined to be crinkled ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base rounded ; emerging leaves absinthe green, immature growing leaves chrysolite green turning olive ochre.

*Inflorescence* : Medium to large, pyramidal, scarlet red ; moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium to large, ovate to ovate oblong ; base slightly flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak distinct to broadly mammiform ; sinus slight to shallow ; apex rounded ; skin thick, smooth to rough, deep chrome ; dots medium, close, flush with the surface ; flesh firm, fibreless, prinnard yellow ; flavour pleasant ; taste medium sweet ; juice moderately abundant.

*Stone* : Large, oblong oval ; covered with sparse, short and soft fibre all over ; veins parallel, slightly to prominently raised.

*Fruit quality* : Good ; bearing early to mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



## THE MANGO

### RAJUMANU

The variety owes its origin to a superior chance-seedling, in Alamanda village of Visakhapatnam district in Andhra State. The fruit matures very early in the season and is exported to distant North Indian markets where it is known under the name of *Safeda*, owing to the light yellow colour of its skin especially when harvested a little earlier than the stage of full maturity. On account of its capacity to bear crops early in the fruiting season, the variety has gained considerable commercial importance in recent years in some of the districts of Andhra State.

*Tree* : Medium, moderately vigorous, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves mignonette green, immature growing leaves ecru olive turning citrine.

*Inflorescence* : Medium, pyramidal, saccardo's umber, densely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight to absent ; ventral shoulder equal to and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak prominent ; sinus slight to absent ; apex rounded to broadly pointed ; skin thin, membranous, forsythia ; dots medium and distant, flush with the surface ; flesh soft, primuline yellow ; moderately fibrous ; fibres medium and soft ; flavour delightful ; taste sweet ; juice abundant to fairly plentiful.

*Stone* : Oblong ; covered with medium and soft fibre all over ; veins forked and grooved.

*Fruit quality* : Good to medium, bearing heavy and early ; moderately resistant to winds and hoppers ; keeping quality medium to poor.



RAJUMANU



RAM KELA

## RAM KELA

The variety is indigenous to the Punjab State. The history of its origin and distribution is not known. It possesses mediocre fruit qualities, and does not, therefore, deserve further popularisation.

*Tree* : Medium, vigorous, spreading, very productive, regular bearing, top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly to strongly folded ; margins wavy ; venation moderately prominent : tip sub-acuminate : base acute : emerging leaves grape green, immature growing leaves orange citrine turning dresden brown.

*Inflorescence* : Medium, conical, pompeian red, moderately puberulent : stamens larger than pistil and oblique to it : staminodes well developed.

*Fruit* : Small to medium, roundish oblique, base obliquely flattened ; stalk inserted squarely ; cavity slight ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate to long curve ; beak a point to slight but distinct ; sinus slight ; apex rounded ; skin medium thick, smooth, palm leaf ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, primuline yellow ; flavour pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium to small, oval to oblong oval ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium to good ; bearing late season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities medium.



## RANEE PASAND

The variety takes its name after the Begum of Murshidabad. It is widely distributed in the Murshidabad district of West Bengal. The history of its distribution is not known for certain. It is, however, believed that the first grafts of the variety planted in Rias Mirza Bagan orchards in Murshidabad formed the chief source of its distribution in other parts of Bengal.

*Tree* : Large, vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots thick.

*Leaves* : Large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded to obtuse ; emerging leaves deep chrysolite green, immature growing leaves cosse green.

*Inflorescence* : Medium, pyramidal, lettuce green, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak absent ; sinus slight ; apex broadly pointed ; skin medium thick, smooth, cadmium yellow ; dots small, distant, flush with the surface ; flesh firm, fibreless, capucine yellow ; flavour mildly pleasant ; taste acidic to sweet ; juice moderate to abundant.

*Stone* : Small to medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked, slightly to prominently raised.

*Fruit quality* : Medium ; bearing heavy and mid-season ; moderately resistant to hoppers and winds ; keeping-quality medium to poor ; peeling-quality medium.



RANEE PASAND



RASPUNIA

## RASPUNIA

The variety is indigenous to Uttar Pradesh. It derives its name from the words "Ras" (Juice) and "Punia" (Spindle), the fruit being spindle-shaped. Its history is not known. It is, however, believed to have originated from a superior chance-seedling. The fruit possesses high qualities. The only defect in this variety is the very small size of its fruits.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire to inclined to be wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves olive, immature growing leaves ecru olive turning citrine.

*Inflorescence* : Medium, conical, acajou red, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Small to medium, oblong sub-reniform ; base obliquely rounded ; stalk inserted obliquely ; cavity absent ; shoulders unequal and level, ventral shoulder ending in a long curve, dorsal shoulder sloping ; beak a point to distinct ; sinus shallow ; apex broadly pointed ; skin medium to thick, smooth to inclined to be rough, capucine yellow with a blush of coral pink on shoulders ; dots small, moderately distant, flush with the surface ; flesh soft, sparingly fibrous, capucine yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Small to medium, oblong ; covered with dense, short and soft fibre all over ; veins parallel and grooved.

*Fruit quality* : Good ; bearing mid-season ; moderately resistant to hoppers and fairly resistant to winds ; keeping-quality medium ; peeling-quality good.



## RATAUL

The variety is also known as *Anwar Rataul*. It is reported to have first originated as a superior chance-seedling in Shohra-e-Afaq Garden in Rataul town in Uttar Pradesh which formed the chief source of its distribution.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing, top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins wavy ; venation moderately prominent ; tip sub-acuminate to acuminate ; base acute ; emerging leaves citrine, immature growing leaves isabella colour turning buffy citrine.

*Inflorescence* : Large, conical, corinthian red, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, ovate ; base flattened ; stalk inserted squarely ; cavity absent ; shoulders equal, level, and rounded ; beak absent to slightly prominent ; sinus absent ; apex rounded ; skin medium thick, smooth, primuline yellow ; dots small, close, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour good ; taste very sweet ; juice moderately abundant.

*Stone* : Medium, oval ; covered with dense, medium and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing medium and mid-season ; moderately resistant to hoppers and winds ; keeping-quality medium to good.



RATAUL



REDDI PASAND

## REDDI PASAND

The variety is also known to some fruit growers as *Safeda* owing to the greenish white yellow colour of the skin of the fruit. It is indigenous to Kodur in Cuddapah district of Andhra State. Little is known about its origin. It was first propagated from the orchards of Late P. V. Chungal Reddy of Kodur by the Fruit Research Station, Kodur, and planted in the variety collection plot at the station which has formed, in recent years, the centre of its distribution. It possesses no special qualities which would justify its wider distribution.

*Tree* : Small to medium, moderately vigorous, spreading, medium productive, uncertain bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, oval lanceolate ; slightly folded ; margins entire ; venation prominent ; tip acute ; base acute ; emerging leaves cosse green, immature growing leaves oil green turning lever brown.

*Inflorescence* : Medium, conical, rose red, sparsely puberulent ; stamens unequal, shorter than pistil and parallel to it ; staminodes well developed.

*Fruit* : Medium, roundish ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders equal, level and rounded ; beak distinct to slightly prominent ; sinus absent ; apex rounded ; skin medium thick, Chinese yellow ; dots medium, close and flush with the surface ; flesh firm, fibreless, baryta yellow ; flavour mildly pleasant ; taste medium sweet ; moderately juicy.

*Stone* : Oblong oval ; covered with short soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Medium to poor ; bearing medium and mid-season ; moderately susceptible to winds and hoppers ; keeping-quality medium.



## REHIMAT KHAS

The variety is reported to have originated as a superior chance-seedling in Shora-e-Afaq Garden in Rataul town in Uttar Pradesh from where it has spread to many other places in that State. It derives its name from 'Rehamat', the name of the person in whose garden it originated, and 'Khas' meaning special.

*Tree* : Medium, vigorous, spreading, very productive, irregular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves prussian red, immature growing leaves morus red turning prussian red.

*Inflorescence* : Medium, conical, hellebore red, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate to long curve ; beak absent ; sinus absent ; apex rounded to broadly pointed ; skin medium to thick, smooth, deep chrome ; dots large, moderately distant, flush with the surface ; flesh firm, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium to small, oblong oval ; covered with short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing heavy ; mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities good.



REHMAT KHAS



ROOS

## ROOS

The variety was selected for study from the Government Experiment Station, Ganeshkind, Poona. The history of its origin and distribution is not known. It possesses poor quality and does not need popularisation.

*Tree* : Medium, moderately vigorous, upright to spreading, unproductive, uncertain bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, slightly folded ; margins entire to inclined to be wavy and twisted ; venation moderately prominent ; tip acuminate ; base rounded to obtuse ; emerging and immature growing leaves mignonette green.

*Inflorescence* : Medium, pyramidal ; pansy purple ; sparsely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, roundish ; base flattened ; stalk inserted squarely ; cavity slight ; shoulders equal, level and rounded ; beak a point ; sinus absent ; apex broadly rounded ; skin medium thick, smooth, calla green ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, primuline yellow, flavour mildly pleasant ; taste insipid to moderately sweet ; juice scanty.

*Stone* : Small, roundish oval ; covered all over with sparse, short and soft fibre ; veins forked and slightly depressed.

*Fruit quality* : Medium to poor ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



## RUMANI

This is a commercial variety of the southern districts of east coast of Madras State. It has, in recent years, spread to other neighbouring districts of Madras.

The variety is very attractive, being apple shaped with a blush of bright red colour on the shoulders of the fruit against bright yellow ground-colour of the skin. It is one of the largest marketable crops in the districts of Chengleput and Arcot of Madras State. It is a very desirable type of commercial mango and deserves to be introduced in all dry and semi-dry tracts of the country. The fruit should be harvested when fully mature to allow for the proper development of taste and quality. Even slightly pre-mature harvesting renders it acidic or sour to taste. The pulp of the fruit is often tinged slight green in colour specially when it is harvested before full maturity. This variety stands transport well even to distant markets.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves hellebore green, immature growing leaves isabella colour.

*Inflorescence* : Medium, Indian lake, sparsely puberulent ; stamens shorter than pistil and parallel to it ; staminodes poorly developed.

*Fruit* : Medium, roundish ; base flattened ; stalk inserted squarely ; cavity shallow ; shoulders equal, level and rounded ; beak absent ; sinus shallow ; apex broadly rounded ; skin thin, primuline yellow with a blush of spectrum red on shoulders ; dots medium, close, flush with the surface ; flesh firm to meaty, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Roundish oval ; covered with sparse, short and soft fibre all over ; veins slightly raised and forked.

*Fruit quality* : Medium to good ; bearing heavy, mid to late-season, sometimes bearing a sparse off-season crop ; keeping-quality good.



RUMANI



SAFFORD PASAND

## DESCRIPTION OF VARIETIES

### SAFDAR PASAND

The variety owes its origin to Murshidabad in West Bengal. It is also known as *Safdar Pasand Beera*. The history of its origin and distribution is not known with certainty. It is said to take its name after the old Nawab of Murshidabad. It is believed to have spread from the first grafts planted in Rais Mirza Bagan orchards in Murshidabad. It is widely distributed in Murshidabad and Nadia districts of West Bengal and to a smaller extent in other districts of Bengal, Bihar and Uttar Pradesh. The variety deserves to be included among the commercial varieties.

*Tree* : Medium, moderately vigorous to slow growing, spreading, very productive, regular bearing ; top rounded ; trunk medium to slender ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent to obscure ; tip sub-acuminate ; base acute ; emerging leaves buffy citrine, immature growing leaves ecru olive turning dresden brown.

*Inflorescence* : Medium, conical, rose dore, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong to oblong oblique ; base rounded ; stalk inserted squarely ; cavity slight ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight ; apex rounded ; skin thick, smooth, golden yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, capucine yellow ; flavour pleasant ; taste sweet, juice moderately abundant.

*Stone* : Medium, oblong ; covered with fairly dense short and soft fibre all over ; veins forked and slightly to prominently raised.

*Fruit quality* : Medium, bearing early season ; fairly resistant to hoppers ; moderately resistant to winds ; keeping and peeling qualities medium.



## SAFEDA CALCUTTA

Although grown largely in Malihabad tehsil in Uttar Pradesh, from where it has been disseminated to many parts of the Indo-Gangetic plains in recent years, it is believed to have originated at Murshidabad in West Bengal. In taste and flavour, it resembles *Lucknow Safeda* but the fruits are much bigger than those of the latter variety. It possesses considerable commercial merit and deserves to be classed among the leading commercial varieties of India.

*Tree* : Medium, vigorous, spreading, medium to productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy and inclined to be twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging and immature growing leaves mignonette green.

*Inflorescence* : Medium, conical, deep chrome, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes moderately developed.

*Fruit* : Large, ovate oblong ; base obliquely rounded to flattened ; stalk inserted obliquely ; cavity slight to shallow ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak prominent ; sinus slight to shallow ; apex rounded ; skin medium to thick, smooth to rough, certosa ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, martius yellow ; flavour pleasant ; taste sweet ; juice scanty to moderately abundant.

*Stone* : Medium to large, oblong oval ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Very good ; bearing mid to late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



SAFEDA CALCUTTA



SAFEDA LUCKNOW

## DESCRIPTION OF VARIETIES

### SAFEDA LUCKNOW

The variety is believed to have originated as a superior chance seedling in *Badsha Bagh* at Lucknow, and was, therefore, known first as *Badsha Pasand*. The grafts from the mother tree were supplied by the Nawab of Lucknow to Fakir Muhamad Khan of Maliahabad, Commander of the army of Gaziuddin Byder, who planted these in his orchards at Maliahabad, from where the variety slowly spread to most other parts of Uttar Pradesh.

*Tree* : Large, moderately vigorous, spreading, very productive, regular bearing ; top rounded ; trunk stocky ; shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves prout's brown, immature growing leaves prout's brown turning forest green.

*Inflorescence* : Large, pyramidal, viridine green, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Large, ovate ; base slightly flattened ; stalk inserted squarely ; cavity slight ; shoulders unequal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight ; apex rounded ; skin thin, smooth, capucine yellow ; dots medium, close, flush with the surface ; flesh soft, sparingly fibrous, primuline yellow ; flavour pleasant ; taste sweet ; juice abundant.

*Stone* : Medium, oblong ; covered with dense, medium and soft fibre all over ; veins parallel and grooved.

*Fruit quality* : Good ; bearing late season ; moderately resistant to winds and hoppers ; keeping-quality medium, peeling-quality good.



## SAFEDA MALIHABAD

The variety is said to owe its origin to the efforts of Fakir Muhammad Khan, one of the Nawabs of Malihabad in Lucknow district of Uttar Pradesh. It is reported that one policeman residing in 'Kewal Har', a sector of Malihabad, had nursed a superior mango tree which attracted the attention of the Nawab on account of its high quality. A few mangoes of this variety were presented by this policeman to the Nawab as a token of respect and the latter being much impressed with their quality asked for a few grafts. After repeated attempts one graft could be nurtured which the Nawab planted in Chamatullah compound from where he multiplied this variety by further grafting, and planted the trees in *Bara Bagh* at Malihabad. From there this variety spread to different parts of Uttar Pradesh as well as other parts of India. It is a very good variety and deserves wide popularisation.

*Tree* : Large, moderately vigorous, spreading, very productive, regular bearing ; top rounded ; trunk medium ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins wavy and inclined to be twisted ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves ecru olive, immature growing leaves yellowish citrine turning olive.

*Inflorescence* : Medium, conical, rose dore, sparsely puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, ovate ; base slightly flattened ; stalk inserted squarely ; cavity absent ; shoulders unequal and level, the ventral broader than the dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak distinct ; sinus slight ; apex rounded ; skin thick, smooth, cadmium ; dots medium to large, moderately distant, flush with the surface ; flesh firm, fibreless, primuline yellow ; flavour delightful ; taste sweet to very sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Very good ; bearing early to late season ; fairly resistant to hoppers and highly resistant to winds ; keeping and peeling qualities good.



SAFEDA MALIHABAD



SAFEDA SHERBATI

## DESCRIPTION OF VARIETIES

### SAFEDA SHERBATI

This variety was studied from the Government Fruit Experiment Station, Sabour in Bihar. Little is known of its history.

*Tree* : Large, vigorous, spreading, medium productive, alternate bearing ; top dome shaped ; trunk stocky ; shoots medium thick.

*Leaves* : Medium, spreading, strongly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves challet red, immature growing leaves old gold green turning green.

*Inflorescence* : Medium, conical, lettuce green, moderately puberulent ; stamens larger than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, roundish oblique ; base obliquely flattened ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral higher than dorsal, ventral shoulder broadly rounded, dorsal shoulder ending in a moderate curve ; beak absent to a slight point which is indistinct ; sinus absent ; apex broadly rounded ; skin thin to medium thick, smooth, empire yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oval oblong, fibrous ; fibres medium, moderately soft, medium all over and large on the ventral edge ; veins parallel, forked and slightly depressed.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



## SAFED MULGOA

The variety is indigenous to Hyderabad State. The history of its origin and distribution is not known. It possesses good fruit qualities and deserves a place among the high quality varieties.

*Tree* : Small, moderately, vigorous, spreading, medium productive, regular to uncertain bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Medium, spreading, strongly reflexed on the mid-rib, oval lanceolate, slightly to strongly folded ; margins entire, twisted ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves pinard yellow, immature growing leaves martius yellow turning pinard yellow.

*Inflorescence* : Large, conical, ecru olive, sparsely puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely rounded ; stalk inserted obliquely ; cavity slight to shallow ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long to moderate curve ; beak prominent to mammi-form ; sinus slight to shallow ; apex rounded ; skin medium thick, smooth, primuline yellow ; dots medium, moderately distant, submerged ; flesh firm, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Oblong oval ; covered with sparse, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing mid to late season ; moderately resistant to hoppers and winds ; keeping-quality good ; peeling-quality medium to good.



SAFED MULGOA



SAKKAR CHINA

SAKKAR CHINA

The variety is indigenous to Bihar. The history of its origin and distribution is not known. It possesses good fruit qualities, and deserves to be introduced in other mango growing regions.

*Tree* : Small, moderately vigorous to slow growing, spreading, medium productive, regular bearing ; top rounded ; trunk slender ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, elliptic lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves deep chrysolite green, immature growing leaves isabella colour turning yellowish citrine.

*Inflorescence* : Medium, pyramidal, tawny, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Small to medium, obliquely oval ; base obliquely flattened ; stalk inserted squarely ; cavity absent to slight ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus absent to slight ; apex broadly pointed to rounded ; skin medium thick, smooth, primuline yellow ; dots medium, close, flush with the surface ; flesh firm, fibreless, primuline yellow ; flavour pleasant to delightful ; taste sweet ; juice moderate to abundant.

*Stone* : Small, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked, slightly depressed to grooved.

*Fruit quality* : Good ; bearing medium and mid-season ; moderately resistant to hoppers and winds ; keeping-quality good ; peeling quality medium.



## SAKKAR GUTLI

The variety comes from Andhra State. It is also, sometimes, known as *Sakkar Para*. The history of its origin and distribution is not known. It is a juicy variety. It was propagated by the Fruit Research Station, Kodur, from the orchards of late P. V. Changal Reddy of Kodur. The Fruit Research Station has formed the chief source of its dissemination in recent years.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves brownish olive, immature growing leaves orange citrine, turning buffy brown.

*Inflorescence* : Medium, pyramidal, jasper red, densely puberulent, stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders equal, level and rounded, dorsal shoulder ending in a moderate curve ; beak distinct to slightly prominent ; sinus slight ; apex broadly pointed ; skin thick, cadmium ; dots medium, moderately distant, flush with the surface ; flesh soft, fibreless, primuline yellow ; flavour mildly pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Oblong, covered with short and soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Good ; bearing medium, mid-season ; moderately resistant to winds and hoppers ; keeping-quality medium.



SAKKAR GUTLI



SALEBHOY AMIDI

## DESCRIPTION OF VARIETIES

### SALEBHOY AMIDI

The variety was studied near Baroda from Mr. S. S. Bhat's garden. It is a choice bearing variety confined to local fruit growers of the State. Its history is not known.

*Tree* : Medium, moderately vigorous, spreading, medium productive, alternate bearing ; top oval ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire and inclined to be twisted ; venation moderately prominent ; tip acuminate ; base acute ; emerging leaves bistre green, growing leaves bistre green turning palm leaf green.

*Inflorescence* : Medium, pyramidal, rose petal red ; moderately pubescent ; stamens unequal and smaller than pistil ; staminodes poorly developed.

*Fruit* : Medium, oblong oval ; base flattened ; stalk inserted squarely ; cavity absent to slight ; shoulders equal and level, ventral shoulder rounded to ending in a moderate curve, dorsal shoulder ending in a moderate curve ; beak slight but distinct and mammiform ; sinus absent to slight ; apex rounded ; skin medium thick, smooth, light chrome with a blush of orange peel on the shoulders ; dots small and moderately distant ; flush with the surface ; flesh firm, fibreless and sparsely fibrous on the ventral edge, golden yellow ; flavour delightful ; taste sweet ; juice abundant.

*Stone* : Medium to large, oblong, fibrous ; fibres medium to sparse, covered all over, large on the ventral edge ; veins parallel and slightly depressed.

*Fruit quality* : Good ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



SALEM BANGALORA

The variety comes from Salem in the South where it is the chief commercial mango variety. It is also known by the name *Irulappan Bangalora*. It was studied from a private orchard near Salem where the mother tree still exists.

*Tree* : Medium, top rounded ; shoots medium thick.

*Leaves* : Out-held with sub-acuminate tip, slightly reflexed and folded ; emerging leaves mingonette green, immature growing leaves isabella colour turning pyrite yellow.

*Inflorescence* : Large, corinthian red, moderately puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium, ovate ; base slightly flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders equal, level and rounded, dorsal shoulder ending in a moderate curve ; beak broadly mammiform ; sinus slight ; apex rounded ; skin medium thick, leathery, smooth, ta-ming ; dots small, close ; flesh firm, fibreless, apricot yellow ; flavour delightful ; taste very sweet ; juice abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Very good, bearing medium, mid-season ; moderately resistant to winds and hoppers ; keeping-quality medium.



SALEM BANGALORA



SAMARBEHISHT ALIBAGH

SAMARBEHISHT ALIBAGH

The variety derives its name from three words: 'Samar', meaning fruit, 'Behisht', meaning heaven and 'Alibagh', the garden belonging to Ali Mohamad Khan in Amroah village in Moradabad district of Uttar Pradesh, where this variety originated. It has spread, in recent years, to most of the places in the Indo-Gangetic plain.

*Tree* : Medium to large, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire, inclined to be twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves dresden brown, immature growing leaves buffy citrine.

*Inflorescence* : Medium, conical, acajou red, moderately puberulent ; stamens smaller than pistil and oblique to it, staminodes poorly developed.

*Fruit* : Medium, oblong oval ; base obliquely rounded and slightly lipped or extended ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral higher than dorsal, and rounded, dorsal shoulder sloping to ending in a long curve ; beak slightly prominent ; sinus slight ; apex rounded ; skin thin, smooth, chinese yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, sparingly fibrous, apricot yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong sub-reniform ; covered with dense, medium and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Good ; bearing heavy, early ; moderately resistant to hoppers and winds ; keeping-quality medium ; peeling-quality good.



## SAMARBEHISHT CHOWSA

One of the *Talukdars* of Sandilla in Malihabad tehsil of Lucknow collected the stones of choicest mango fruits of Malihabad and planted them in his village Chowsa. One of these seedlings is reported to have given rise to this superior chance-seedling. Its name is compound of three words : 'Samar', meaning fruit, 'Behisht' meaning heaven, and 'Chowsa' the name of the village of its origin—thus meaning 'the heavenly fruit of Chowsa'. It is also known as *Kajri*. According to one narration, a servant of Muhamad Yusuf Khan, *Talukdar* of Sandilla, secretly planted the grafts of this variety in his garden in Malihabad. When the garden was about ten years old, it changed hands and its new master, who was very much struck with the high quality of the fruit, called it *Khajri* meaning thereby that it was the parent of the *Fajri* mango. The leaves of this commercial variety resemble those of the *Fajri* although there is a marked difference in the fruit-qualities of the two.

*Tree* : Medium, moderately vigorous, spreading, medium to productive, inclined to be alternate bearing : top rounded : trunk medium : shoots medium to thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded : margins entire, inclined to be wavy and slightly twisted : venation prominent : tip sub-acuminate : base acute : emerging leaves citrine, immature growing leaves saccardos umber turning dresden brown.

*Inflorescence* : Medium, conical, morous red, moderately puberulent : stamens smaller than pistil and oblique to it : staminodes well developed.

*Fruit* : Medium, ovate to oval oblique : base obliquely flattened : stalk inserted squarely : cavity absent : shoulders equal, ventral higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in long curve : beak distinct to prominent : sinus slight : apex rounded : skin medium thick, smooth, jasmine : dots small, moderately distant, flush with the surface : flesh firm, fibreless, amber yellow : flavour strong and pleasant : taste sweet : juice moderately abundant.

*Stone* : Medium to large, oblong : covered with short, sparse and soft fibre all over : veins forked and slightly depressed.

*Fruit quality* : Good : bearing heavy : mid to late season : moderately resistant to hoppers and winds : keeping-quality medium to good : peeling-quality medium.



SAMARBEHISHT CHOWSA



SAMARBEHISHT RAMPUR

## DESCRIPTION OF VARIETIES

### SAMARBEHISHT RAMPUR

The variety derives its name from 'Samar Behisht', meaning heavenly fruit, and Rampur, an erstwhile State of Uttar Pradesh. It is believed to have originated in Karna village in Muzafarnagar in Uttar Pradesh, as a superior chance-seedling. It is said that Kalbe Ali, the grandfather of the Nawab of Rampur, purchased its grafts at a fancy price, and gave the name of *Samarbehisht Rampur* to the variety.

*Tree* : Medium, moderately vigorous, upright to spreading, productive, regular bearing ; top rounded to vase form ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves buffy citrine, immature growing leaves orange citrine turning medal bronze.

*Inflorescence* : Small, conical, cosse green, moderately puberulent ; stamens equal, oblique to pistil ; staminodes well developed.

*Fruit* : Medium, ovate ; base slightly flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak distinct to slightly prominent ; sinus slight to absent ; apex rounded ; skin thin to medium thick, smooth, wax yellow ; dots medium, distant, flush with the surface ; flesh soft, sparsely fibrous, primuline yellow ; flavour pleasant to delightful ; taste very sweet ; juice moderate to abundant.

*Stone* : Medium, oblong oval ; covered with fairly dense, short and soft fibre all over and medium on the ventral edge ; veins parallel and slightly depressed.

*Fruit quality* : Very good ; bearing mid-season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



## SANGTRA

The variety is said to have originated as a superior chance-seedling in the garden of Inayatullah Khan at Hardoi in Uttar Pradesh, from where it has spread, in recent years, to other parts of the State. It has a mild orange flavour, and hence the name *Sangtra* (orange).

*Tree* : Medium : moderately vigorous, spreading, medium productive, alternate bearing : top rounded : trunk medium : shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded : margins entire : venation moderately prominent : tip acute : emerging leaves isabella colour, immature growing leaves wax yellow turning ecru green.

*Inflorescence* : Medium, conical, citron green, moderately puberulent : stamens smaller than pistil and oblique to it : staminodes poorly developed.

*Fruit* : Small to medium, ovate : base rounded : stalk inserted squarely : cavity absent : shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve : beak absent : sinus slight to absent : apex rounded : skin medium thick, smooth, primuline yellow : dots small, close, flush with the surface : flesh firm, fibreless, empire yellow : flavour pleasant : taste sweet : juice scanty to moderately abundant.

*Stone* : Medium, oblong oval : covered with fairly dense, short and soft fibre all over : veins parallel and slightly depressed.

*Fruit quality* : Good : bearing medium, mid-season : moderately resistant to winds and hoppers : keeping-quality good : peeling-quality medium.



SANGTRA



SARDAR

## SARDAR

The variety was studied from Shri Barjorji Hormusji's Garden near Baroda. Its cultivation is confined to Baroda State only, and it is not grown commercially. It is a choice bearing variety deserving greater popularity. The history of the variety is not known.

*Tree*: Medium, moderately vigorous, spreading, medium, productive, regular bearing; top rounded; trunk medium; shoots medium thick to thick.

*Leaves*: Small to medium, spreading, strongly reflexed on the mid-rib, oval lanceolate, strongly folded; margins entire; venation moderately prominent; tip acute; base acute; emerging and immature growing leaves course green.

*Inflorescence*: Medium, pyramidal, corinthian red, moderately pubescent; stamens equal and oblique to pistil; staminodes poorly developed.

*Fruit*: Medium, ovate; base slightly flattened to obliquely flattened; stalk inserted squarely; cavity slight to absent; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve; beak slightly prominent to mammiform; sinus slight; apex rounded; skin thick, rough and inclined to be warty; golden glow; dots medium to large, distant, flush with the surface, flesh firm to soft, fibreless to sparsely fibrous near the stone, cadmium yellow; flavour pleasant; taste sweet to medium, juice scanty to moderately abundant.

*Stone*: Medium, oval oblong, moderately fibrous; fibres moderate, soft to medium, short all over and medium on the ventral edge; veins parallel and forked, and slightly raised.

*Fruit quality*: Good; bearing early to mid-season; moderately resistant to hoppers and winds; keeping-quality good; peeling-quality medium.



## SAUNFIA

The variety derives its name from its characteristic smell which resembles the *Saunf* or Aniseed scent. The history of origin and distribution of the variety is not known. Its cultivation is, at present, confined mainly to Uttar Pradesh. The variety possesses mediocre fruit qualities and does not, therefore, deserve further popularisation.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire and inclined to be twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves ecru olive, immature growing leaves olive turning olive lake.

*Inflorescence* : Medium, conical, light corinthian red, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Large, oblong sub-reniform ; base necked to tapering ; stalk inserted obliquely ; cavity absent ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then ending in a long curve, dorsal shoulder falling abruptly ; beak slightly prominent ; sinus shallow ; apex rounded ; skin medium thick, rough and inclined to be warty, deep chrome ; dots medium, moderately distant, flush with the surface ; flesh soft, sparingly fibrous, primuline yellow ; flavour mildly pleasant with a tinge of turpentine ; taste moderate to sweet ; juice abundant to plentiful.

*Stone* : Large, oblong ; covered with fairly dense, short and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Fair, bearing mid-season ; moderately resistant to hoppers and fairly resistant to winds ; keeping-quality poor ; peeling-quality medium.



SAUNFIA



SEHROLI

## SEHROLI

It is a renowned seedling-variety of Delhi now propagated as a graft-variety. It originated in Sehroli village near Delhi as a superior chance-seedling. It strongly resembles the variety *Bombay Green* or *Malda*.

*Tree* : Medium to large, vigorous, spreading, medium productive, uncertain bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, flat and inclined to be folded ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; immature growing leaves mignonette green.

*Inflorescence* : Medium to large, conical, pansy purple, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes moderately developed.

*Fruit* : Medium, ovate oblong ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak absent to a point ; sinus slight ; apex rounded ; skin medium thick, smooth, moss green ; dots medium, close to moderately distant, flush with the surface ; flesh firm, soft, fibreless, cadmium yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong oval ; covered with dense and short to medium soft fibre all over ; veins forked, slightly depressed to grooved.

*Fruit quality* : Medium to good ; bearing mid-season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities good.



## THE MANGO

### SEPIYA SHAH PASAND

The variety derives its name from the large flat shape of the fruit—'Sepia', meaning sea shell and 'Shah Pasand' meaning favourite of the king. The history of its origin and distribution is not known.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves orange citrine, immature growing leaves brick red turning light brownish olive.

*Inflorescence* : Medium, conical, prussian red ; moderately puberulent ; stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Medium to large, oblong oval to oblong ; base rounded ; stalk inserted obliquely ; cavity absent ; shoulders unequal and level, ventral shoulder broader than dorsal and rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight to shallow ; apex rounded ; skin medium thick, smooth forest green ; dots medium, moderately distant, flush with the surface ; flesh firm, sparingly fibrous, wax yellow ; flavour pleasant ; taste moderately sweet ; juice moderate to abundant.

*Stone* : Large, oblong to oblong oval ; covered with dense, short and soft fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Medium ; bearing early to mid-season ; moderately resistant to hoppers and winds ; keeping-quality medium ; peeling-quality good.



SEPIYA SHAH PASAND



SHADWALA

## SHADWALA

The variety originated in Murshidabad in West Bengal. Its history is not fully known. It is believed to have spread from the first grafts planted in Rais Mirza Bagan orchards in Murshidabad. It is widely distributed in Murshidabad and Nadia Districts, and to a lesser extent in Hoogly and 24 Parganas district, of West Bengal. It is also known as *Shadulla* in some parts of Bengal. It possesses high fruit qualities and deserves to be planted in house gardens.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire, inclined to be wavy and twisted ; venation moderately prominent ; tip acute ; base acute ; emerging and immature growing leaves mikado turning orange citrine.

*Inflorescence* : Medium, conical, lettuce green moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, ovate oblique ; base obliquely flattened ; stalk inserted obliquely ; cavity shallow ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak absent ; sinus absent to slight ; apex rounded ; skin medium thick, smooth, cadmium ; flavour pleasant ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour pleasant ; taste very sweet ; juice moderate to abundant.

*Stone* : Medium, oblong oval ; covered with dense, short and soft fibre all over, veins forked and slightly depressed.

*Fruit quality* : Good ; bearing medium, mid-season ; fairly resistant to hoppers and winds ; keeping-quality very good ; peeling-quality medium.



## THE MANGO

### SHAH PASAND

This variety originated in Murshidabad in West Bengal. The history of its origin is not known. It is believed to have spread from the grafts planted in Rais Mirza Bagan orchards in Murshidabad. It is widely distributed in Murshidabad and Nadia districts, and to a lesser extent in Hoogly district of West Bengal. The variety is suitable for commercial planting.

*Tree* : Medium, moderately vigorous, upright, productive, regular bearing ; top vase form to rounded ; trunk medium ; shoots slender to medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation obscure ; tip sub-acuminate ; base acute ; emerging and immature growing leaves martius yellow.

*Inflorescence* : Medium, pyramidal, grape green, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, ovate oblong ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight to shallow ; apex rounded to broadly pointed ; skin thick, smooth, cadmium yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless, primuline yellow ; flavour pleasant with traces of turpentine ; taste sweet ; juice moderate to abundant.

*Stone* : Medium oblong ; covered with dense, short and soft fibre all over the medium on the ventral edge ; veins forked and slightly raised.

*Fruit quality* : Medium to good ; bearing heavy and early ; moderately resistant to hoppers and winds ; keeping-quality good ; peeling-quality medium.



SHAH PASAND



SHAMSUL-ASAMAR

SHAMSUL-ASAMAR

The variety is believed to have originated as a superior chance-seedling at Lodhpuria near the compound of the Malihabad tehsil office from where it spread to other parts of Uttar Pradesh. The name *Shamsul-Asamar* means literally 'the sun among fruits'. It is also called *Bangalawala* by some of the mango growers after the name of a garden in Malihabad. It is reported that grafts of this variety fetched fancy prices in earlier times.

*Tree* : Medium, moderately vigorous, spreading, very productive, inclined to be alternate bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins inclined to be wavy and twisted ; venation prominent ; tip sub-acuminate ; base acute ; emerging leaves amber brown turning elm green.

*Inflorescence* : Medium, pyramidal, brick red, sparsely puberulent ; stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Medium, ovate ; base slightly flattened ; stalk inserted squarely ; cavity shallow ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak a point, to missing ; sinus slight ; apex rounded ; skin thin, smooth primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm, fibreless primuline yellow ; flavour pleasant ; taste sweet ; juice scanty.

*Stone* : Medium, oval ; covered with fairly dense, short and soft fibre all over ; veins forked and prominently raised.

*Fruit quality* : Good ; bearing early ; moderately resistant to hoppers and winds ; keeping-quality medium ; peeling-quality good.



## THE MANGO

### SHENDRIYA

The variety is indigenous to Bombay State. The history of its origin and distribution is not known. It is fairly popular, although it is of medium quality, owing to its heavy cropping propensities.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire, sometimes inclined to be wavy and twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves chrysolite green, immature growing leaves ecru green turning cource green.

*Inflorescence* : Medium, pyramidal, tawny, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Small to medium, roundish oblique to ovate oblique ; base obliquely flattened ; stalk inserted squarely ; cavity absent to slight ; shoulders equal, ventral higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder rounded to ending in a moderate curve ; beak absent to a point ; sinus absent ; apex obliquely flattened ; skin medium thick, smooth, lettuce green with a blush of light coral red on shoulders ; dots small, close, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour mildly pleasant ; taste moderately sweet ; juice scanty to moderately abundant.

*Stone* : Medium to small, oval ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and prominently raised.

*Fruit quality* : Medium ; bearing heavy, mid-season ; moderately resistant to hoppers and winds ; keeping and peeling-qualities medium.



SHENDRIYA



SINDHURA

SINDHURA

The variety is quite attractive on account of deep red (Sindoor) colour. It was selected for study from a private orchard near Salem. It is fairly popular locally, and fetches good price. The history of its origin is not known.

*Tree* : Large ; top rounded ; shoots medium thick.

*Leaves* : Out-held, slightly reflexed and folded, emerging leaves cosse green, immature growing leaves mignonette green turning ecru olive.

*Inflorescence* : Medium, maritus yellow, densely puberulent ; stamens shorter than pistil and parallel to it, staminodes poorly developed.

*Fruit* : Medium, ovate ; base flattened ; stalk inserted squarely ; cavity slight ; ventral shoulder equal to and slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak distinct ; sinus slight ; apex rounded ; skin medium thick, deep chrome ; dots medium and distant ; flesh firm, fibreless, capucine orange ; flavour delightful, taste sweet ; juice moderately abundant.

*Stone* : Oblong oval, covered with short and soft fibre all over ; veins slightly forked and grooved.

*Fruit quality* : Good ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping-quality good.



## SOBEWALI TING

The variety is said to have spread from Muzaffargarh in West Punjab. It owes its origin to a superior chance-seedling in the orchards of Soba Khan. Soba Khan on finding one particular branch of a mango tree bearing large-sized fruits quite different in shape and quality from the other fruits of the tree, propagated a few grafts from that branch and planted them in his garden, which has formed the main source of distribution of this variety. The name *Sobewali Ting*, means branch belonging to Soba Khan. The fruits of this variety are very small in size, and it has not, therefore, attained much popularity in spite of the high quality of the fruit.

*Tree* : Medium, vigorous, spreading, very productive, regular bearing : top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy and twisted ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves citrine, immature growing leaves dresden brown.

*Inflorescence* : Medium, conical, pyrite yellow, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Small, ovate sub-reniform ; base rounded and slightly extended ; stalk inserted squarely ; cavity absent ; shoulders equal and level, sloping to ending in a long curve ; beak slight but distinct ; sinus shallow ; apex rounded ; skin medium to thick, golden glow ; dots small, moderately distant, flush with the surface ; flesh firm to soft ; sparingly fibrous, apricot yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Small, oblong reniform ; covered with short and soft fibre all over ; veins forked and slightly depressed to grooved.

*Fruit quality* : Good ; bearing heavy and late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



SOBEWALI TING



SINDH TARA

## DESCRIPTION OF VARIETIES

### SUKH TARA

The history of origin and distribution of the variety is not known. Its spread is, at present, confined to Uttar Pradesh. It possesses mediocre fruit qualities and does not, therefore, deserve to be popularised.

*Tree* : Medium, moderately vigorous, spreading, very productive, regular bearing ; top rounded to dome shaped ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves diamene brown, immature growing leaves diamene brown turning light seal brown.

*Inflorescence* : Medium, conical, carmine, moderately puberulent ; stamens unequal ; smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong sub-reniform ; base slightly flattened ; stalk inserted squarely ; cavity slight to shallow ; shoulders unequal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus shallow to deep ; apex rounded ; skin medium to thick, smooth, primuline yellow ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, empire yellow ; flavour pleasant ; taste sweet to medium sweet ; juice moderately abundant.

*Stone* : Medium, oblong sub-reniform ; covered with dense, short and soft fibre all over ; veins parallel and slightly raised.

*Fruit quality* : Fair ; bearing mid-season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities medium.



## THE MANGO

### SUKUL

The variety is indigenous to Bihar State. The history of its origin and distribution is not known. Owing to its heavy cropping propensities, it has gained fair amount of commercial importance despite its medium fruit qualities.

*Tree* : Large, vigorous to moderate, spreading, very productive, regular bearing : top rounded : trunk stocky : shoots medium to thick.

*Leaves* : Large, spreading, slightly reflexed on the mid-rib, ovate lanceolate, slightly folded : margins wavy, venation moderately prominent : tip sub-acuminate : base rounded : emerging leaves saccardos umber, immature growing leaves orange citrine turning ecru olive.

*Inflorescence* : Medium, pyramidal, olive ochre, densely puberulent : stamens unequal, smaller than pistil and parallel to it : staminodes poorly developed.

*Fruit* : Medium to large, oblong oblique : base obliquely rounded : stalk inserted obliquely : cavity absent to rarely slight : shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve : beak a point : sinus slight : apex rounded : skin thick, smooth, primuline yellow : dots medium, moderately distant, flush with the surface : flesh firm, fibreless, pale lemon yellow : flavour mildly pleasant : taste medium sweet to sub-acid : juice scanty to moderately abundant.

*Stone* : Large, oblong : covered with dense, short and soft fibre all over and medium on the ventral edge : veins forked and slightly depressed.

*Fruit quality* : Medium to good : bearing heavy, late season : moderately resistant to hoppers and winds : keeping-quality good : peeling-quality medium.



SUKUL



SUNDERPRASAD

SUNDERPRASAD

This variety is believed to have originated in Bihar State. The history of its origin and distribution is not known. It is of mediocre quality and deserves no special attention.

*Tree* : Medium to large, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk stocky ; shoots medium thick.

*Leaves* : Medium to large, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves dark olive buff, immature growing leaves ecru olive turning isabella colour.

*Inflorescence* : Medium to large, conical, brick red, moderately puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium, ovate oblong ; base slightly flattened ; stalk inserted squarely ; cavity slight ; shoulders equal, dorsal slightly higher than ventral, ventral shoulder ending in a moderate curve, dorsal shoulder ending in a moderate to long curve ; beak distinct ; sinus absent to slight ; apex broadly pointed ; skin medium thick, smooth to slightly rough, deep chrome ; dots small, distant, flush with the surface ; flesh firm to soft, fibreless, primuline yellow ; flavour pleasant ; taste medium to sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered all over with dense, short and soft fibre ; veins forked, slightly depressed to grooved.

*Fruit quality* : Medium ; bearing medium and early ; fairly resistant to hoppers and winds ; keeping and peeling qualities medium.



SUNDERSHA HYDERABAD

The variety was selected for study from Hyderabad State. The history of its origin and distribution is not known. It possesses mediocre fruit-quality and does not deserve further popularisation.

*Tree* : Small, moderately vigorous, spreading, unproductive to medium productive, regular to uncertain bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; inclined to be wavy and twisted ; venation moderately prominent ; tip acute ; base acute ; emerging leaves pinnard yellow, immature growing leaves lime green.

*Inflorescence* : Medium, conical, cource green, sparsely puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium to large, oblong to oblong oblique ; base obliquely rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader and higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak a point to distinct ; sinus slight ; apex rounded ; skin medium thick, smooth, primuline yellow ; dots medium, moderately distant, submerged ; flesh firm, fibreless, apricot yellow ; flavour pleasant, taste medium sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with fairly dense, short and soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Medium ; bearing medium ; moderately resistant to winds and hoppers ; keeping-quality medium ; peeling-quality good.



SUNDERSHA HYDERABAD



SUNDERSHA KUMTA

SUNDERSHA KUMTA

The history of origin and distribution of the variety is not known. It was selected for study from the grafts planted at the Government Farm at Kumta in North Kanara district in Bombay State. It is of mediocre quality, and does not deserve wider popularisation.

*Tree* : Medium, moderately vigorous, spreading, medium productive, alternate bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation obscure ; tip sub-acuminate ; base acute ; emerging leaves sulphine yellow, immature growing leaves lettuce green turning cosse green.

*Inflorescence* : Medium, pyramidal, ecru olive, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium to large, oblong oval to oblong ; base rounded and extended ; stalk inserted squarely ; cavity absent ; shoulders equal and level ; ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent ; sinus slight ; apex rounded to broadly pointed ; skin thick, smooth, golden yellow ; dots large and close, flush with the surface ; flesh soft, fibreless, empire yellow ; flavour pleasant to mildly pleasant ; taste moderately sweet ; juice moderate to abundant.

*Stone* : Large, oblong ; covered with sparse, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly raised.

*Fruit quality* : Medium ; bearing mid-season ; moderately resistant to winds and hoppers ; keeping-quality poor to medium ; peeling-quality medium.



## SURKH BURMA

The variety is believed to be indigenous to Bihar State. The history of its origin and distribution is not known. It is also known to some mango growers and nurserymen as *Bride of Russia*—apparently due to the blush of purple red colour on the shoulders and most other parts of the fruit.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium to thick.

*Leaves* : Large, spreading slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire to inclined to be twisted ; venation moderately prominent ; tip sub-acuminate ; base rounded ; emerging leaves olive lake, immature growing leaves citrine turning ecru olive.

*Inflorescence* : Medium, pyramidal, acajou red, densely puberulent ; stamens equal and parallel to pistil ; staminodes well developed.

*Fruit* : Medium, ovate ; base rounded ; stalk inserted obliquely ; cavity absent ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak mammiform ; sinus absent to slight ; apex rounded ; skin medium thick, smooth to inclined to be rough, cadmium yellow with a blush of etruscan red on shoulders and most parts of the fruit ; dots medium, moderately distant, submerged ; flesh firm to pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins parallel and slightly grooved.

*Fruit quality* : Medium to good ; bearing medium and early ; moderately resistant to hoppers and winds ; keeping and peeling qualities medium.



SURKH BURMA



SURKHA PANDITWALA

## DESCRIPTION OF VARIETIES

### SURKHA PANDITWALA

This is a superior chance-seedling variety from the Punjab, popularly known as *Sindhuria*. At present, its cultivation is restricted to Panipat tehsil of the State. The variety derives its name from the colour of the fruit. It possesses good fruit qualities and deserves further popularisation.

*Tree* : Medium, vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded, inclined to be crinkled ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves buffy citrine, immature growing leaves cosse green turning deep chrysolite green.

*Inflorescence* : Medium, conical, prussian red, moderately puberulent ; stamens equal and oblique to pistil ; staminodes well developed.

*Fruit* : Medium, roundish oblique ; base obliquely flattened, stalk inserted squarely ; cavity shallow ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a moderate curve ; beak distinct ; sinus absent ; apex rounded ; skin medium thick, smooth to inclined to be rough, primuline yellow, with blush of corinthian red ; dots small, distant and flush with the surface ; flesh firm to soft, fibreless, cadmium yellow ; flavour pleasant to delightful ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oval ; covered with dense, short and soft fibre all over and medium on the ventral edge ; veins forked and slightly depressed.

*Fruit quality* : Medium, bearing mid-season ; moderately resistant to winds and hoppers ; keeping and peeling qualities medium.



## SUVERNAREKHA

This is a commercial variety of the Visakhapatnam district in Andhra State. It owes its origin to a chance-seedling in one of the private gardens in the neighbourhood of the Visakhapatnam-Vizianagaram trunk road at Alamanda.

The variety is of recent origin and is fast spreading in most of the adjoining districts. It ripens very early in the season, and has good keeping-quality, possibly on account of the thick skin of the fruit, and is exported even to distant North Indian markets under the name of *Sundri*. The fruit is very attractive in colour, having a blush of deep red colour on shoulders against the background of orange yellow colour of the skin. The variety is also known as *Chinnasuvananarekha*. In Orissa, it is called *Lat-Sundri*.

*Tree* : Large, moderately vigorous, spreading, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves rainette green ; immature growing leaves medal bronze turning dresden brown.

*Inflorescence* : Medium, conical, corinthian red ; moderately puberulent ; stamens shorter than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium, ovate oblong ; base slightly flattened ; stalk inserted squarely ; cavity slight ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak a point ; sinus slight ; apex rounded ; skin medium thick, light cadmium with a blush of jasper red ; dots small, close ; flesh soft, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice abundant.

*Stone* : Oblong oval ; covered with short and soft fibre all over ; veins parallel to forked and slightly to prominently raised.

*Fruit quality* : Medium to good ; bearing heavy and early ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



SUARNAREKHA



SWARAPADU

## DESCRIPTION OF VARIETIES

### SWARAPADU

The variety comes from Andhra State. Little is known about its origin and distribution. The fruit is of mediocre quality. Due to its heavy bearing nature it is, however, grown to some extent as a commercial variety in certain districts of Andhra.

*Tree* : Large, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, ovate lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves citrine, immature growing leaves emerald green turning brick red.

*Inflorescence* : Medium, pyramidal, prout's brown, moderately puberulent ; stamens shorter than pistil and parallel to it ; staminodes poorly developed.

*Fruit* : Medium to large, oblong elliptic ; base broadly pointed to tapering ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder sloping to ending in a moderate curve, dorsal shoulder sloping to falling abruptly ; beak mammiform ; apex broadly pointed ; sinus slight to absent ; skin medium thick, leathery, primuline yellow ; dots medium, close, flush with the surface ; flesh firm, fibreless, light cadmium ; flavour aromatic ; taste medium sweet ; juice moderately abundant.

*Stone* : Oblong ; covered with short and soft fibre all over ; veins slightly forked and raised.

*Fruit quality* : Medium, mid to late season ; bearing heavy ; moderately resistant to hoppers and winds ; keeping-quality medium to good.



## THE MANGO

### TAIMURIA

It is one of the best varieties of Bihar and deserves introduction in other mango growing regions as a choice bearing variety. The history of its origin and distribution is not known. Possessing as it does very fine fruit qualities, it has already spread to some parts of Uttar Pradesh.

*Tree* : Medium, moderately vigorous, spreading, medium to productive, regular bearing ; top rounded ; trunk stocky ; shoots medium to thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, elliptic lanceolate, flat ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves isabella colour, immature growing leaves ecru green turning olive yellow.

*Inflorescence* : Medium, pyramidal, cource green, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium, obliquely oval to oblong oblique ; base obliquely flattened ; stalk inserted obliquely ; cavity slight ; shoulders unequal, ventral higher than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak distinct to mammiform ; sinus slight to shallow ; apex rounded to broadly pointed ; skin thick, smooth, primuline yellow ; dots small, moderately distant, flush with the surface ; flesh firm to soft, fibreless, capucine yellow ; flavour pleasant ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong sub-reniform ; covered with dense and short fibre all over ; veins forked and slightly depressed.

*Fruit quality* : Very good ; bearing medium to heavy, late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



TAIMURIA



TENNERU

The variety is believed to be native to the East Godavary district in Andhra State. The history of its origin and distribution is not known. It has no special features justifying wider popularisation, excepting the exceptionally large size of the fruit which gives it exhibition value.

*Tree* : Medium, moderately vigorous, spreading, unproductive, regular bearing ; top rounded ; trunk stocky to medium ; shoots medium thick.

*Leaves* : Small, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves hellebore green, immature growing leaves acajou red turning citrine.

*Inflorescence* : Medium, conical, martius yellow, densely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Large, oblong to ovate oblong, sub-reniform ; base rounded to slightly flattened ; stalk inserted squarely ; cavity slight ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak a point ; sinus shallow ; apex broadly pointed ; skin thin, smooth, sunray ; dots small, distant, flush with the surface ; flesh soft, fibreless, cadmium yellow ; flavour mildly pleasant ; taste moderately sweet ; juice moderately abundant.

*Stone* : Large, oblong ; sparingly fibrous ; fibres sparse, short and soft ; covered all over the surface of the stone ; veins forked and slightly raised.

*Fruit quality* : Medium to poor ; bearing poor and mid-season ; fairly resistant to hoppers and winds ; keeping and peeling qualities medium.



## TOTAPURI KUMTA

The variety was selected for study from the Government Experiment Station at Kumta in Bombay State. It is different from the variety of the same name cultivated in Madras State, but is identical with the *Goa* variety cultivated at the Government Central Farm at Ollukara in Cochin State. It possesses poor fruit quality, the only desirable feature being its heavy bearing nature.

*Tree* : Medium, moderately vigorous to slow growing, spreading to drooping, highly productive, regular bearing ; top rounded to dome shaped ; trunk medium ; shoots medium thick.

*Leaves* : Small, out-held, slightly reflexed on the mid-rib and flat, emerging leaves madder brown, immature growing leaves capucine yellow turning brick red.

*Inflorescence* : Medium, spinal red, sparsely puberulent ; style longer than stamens and parallel to it ; staminodes poorly developed.

*Fruit* : Large, symmetrically oval ; base obliquely flattened and slightly extended ; stalk inserted obliquely ; cavity absent ; shoulders level, ventral shoulder rounded and markedly broader than dorsal, dorsal shoulder sloping ; beak out-curved ; apex broadly pointed ; sinus slight ; skin rough, thick, golden yellow ; moderately fibrous, fibres medium and soft ; flavour flat ; taste turpinous ; moderately juicy.

*Stone* : Oblong ; covered with medium and soft fibre all over ; veins forked and slightly to prominently raised.

*Fruit quality* : Medium to poor ; bearing very heavy and early ; heavily susceptible to hoppers and moderately resistant to winds ; keeping quality medium.



TOTAPURI KUMTA



TOTAPURI RATNAGIRI

## DESCRIPTION OF VARIETIES

### TOTAPURI RATNAGIRI

The variety comes from Ratnagiri district in Bombay State, where it is grown on a limited scale. The history of its origin and distribution is not known. It possesses mediocre fruit quality and, does not, therefore, justify wider popularisation.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk stocky ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base rounded ; emerging leaves ecru green, immature growing leaves prussian red turning cource green.

*Inflorescence* : Medium, pyramidal, ecru olive, moderately puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, ovate ; base rounded ; stalk inserted squarely ; cavity absent ; shoulders unequal, ventral broader than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak broadly mammiform ; sinus slight to shallow ; apex broadly rounded to flattened ; skin medium thick, smooth, deep chrome ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, light cadmium ; flavour mildly pleasant ; taste moderately sweet to insipid ; juice scanty to moderately abundant.

*Stone* : Medium to large, oblong oval ; covered with fairly dense, short and soft fibre all over ; veins forked and prominently raised.

*Fruit quality* : Fair to poor ; bearing late season ; moderately resistant to hoppers and fairly resistant to winds ; keeping and peeling qualities medium.



## TOTAPURI SMALL RED

The variety derives its name from the peculiar shape of the beak of the fruit, resembling that of a parrot *Tota*. The history of its origin and distribution is not known. It possesses mediocre fruit qualities and does not, therefore, deserve further popularisation. The only desirable feature of the fruit is its attractive colour.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots slender.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves ecru olive, immature growing leaves saccardos umber turning orange citrine.

*Inflorescence* : Medium, conical, rose red, moderately puberulent ; stamens smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Small to medium, oblong elliptic ; base lipped or extended ; stalk inserted squarely ; cavity absent ; shoulders equal and level, ventral shoulder ending in a long curve, dorsal shoulder sloping to falling abruptly ; beak mammiform ; sinus shallow ; apex broadly pointed ; skin medium thick, rough, capucine yellow with a blush of corinthian red on most part of the fruit ; dots medium, moderately distant, flush with the surface ; flesh firm, fibreless, cadmium yellow ; flavour pleasant ; taste medium sweet ; juice scanty to moderately abundant.

*Stone* : Small, oblong sub-reniform ; covered with sparse, short and soft fibre all over ; veins parallel and slightly depressed.

*Fruit quality* : Fair ; bearing late season ; moderately resistant to hoppers and winds ; keeping-quality good ; peeling-quality poor.



TOTAPURI SMALL RED



VAN RAJ

## VAN RAJ

The variety was studied from Mr. S. S. Bhat's Garden near Baroda. It is a highly prized variety of Baroda State and fetches good returns. Due to the attractive colour, size, and taste of the fruit, it deserves to be introduced in other parts of the country, too. Little is known about its history.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval-lanceolate, flat ; margins wavy ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves lettuce green, immature growing leaves lettuce green turning cource green.

*Inflorescence* : Medium, pyramidal, light jasper, sparsely puberulent ; stamens equal and oblique to pistil ; staminodes poorly developed.

*Fruit* : Medium to large, ovate oblong ; base obliquely flattened ; stalk inserted obliquely ; cavity absent to slight ; shoulders unequal, ventral higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak absent to a point ; sinus slight ; apex broadly rounded ; skin medium thick, smooth, deep chrome with a blush of jasper red on the shoulders ; dots medium and moderately distant, flush with the surface but at times submerged ; flesh firm to soft, fibreless, cadmium, flavour delightful and aromatic ; taste sweet ; juice abundant.

*Stone* : Medium to large ; oblong oval, sparsely fibrous ; fibres medium and soft all over, and large on the ventral edge ; veins parallel and forked, slightly raised.

*Fruit quality* : Good ; bearing mid to late season ; moderately resistant to hoppers and winds ; keeping and peeling qualities good.



VELLAI KOLAMBAN

This is a variety from Ceylon, introduced by Madras Government, and was recorded from the Government Fruit Research Station, Kodur in Andhra State. It is polyembryonic in nature.

*Tree* : Large, vigorous, spreading, regular bearing : top rounded : trunk stocky ; shoots medium thick.

*Leaves* : Large, spreading, strongly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins wavy and twisted : venation moderately prominent : tip sub-acuminate : base acute : emerging leaves eve green, immature growing leaves eve green turning grass green.

*Inflorescence* : Large, conical, pyrethrum yellow, sparsely puberulent : stamens smaller than pistil and oblique to it : staminodes poorly developed.

*Fruit* : Small to medium, oblong, base tapering : stalk inserted obliquely : cavity absent : shoulders unequal, ventral lower than dorsal and falling abruptly, dorsal ending in a long curve : beak a point but distinct : sinus shallow : apex broadly rounded : skin thin to medium thick, smooth, empire yellow : dots medium and distant, flush with the surface : flesh firm to soft, sparsely fibrous, golden glow : flavour mildly pleasant : taste moderately sweet ; juice moderately abundant.

*Stone* : Medium, oblong, moderately fibrous : fibres short all over and medium on the ventral edge : veins parallel and forked and slightly depressed.

*Fruit quality* : Fair : bearing mid to late season : moderately resistant to hoppers and winds ; keeping-quality fair : peeling-quality medium.



VELLAI KOLAMBAN



WILLARD

## WILLARD

The variety belongs originally to Ceylon. It was studied from the Varietal Collection Block at the Government Fruit Experiment Station, Kodur, Andhra State. Little is known of its history. It is a mediocre variety, valued only on account of the attractive colour of the fruit.

*Tree* : Medium, moderately vigorous, spreading, medium productive, regular bearing, dome shaped ; trunk medium ; shoots medium thick.

*Leaves* : Small, drooping, strongly reflexed on the mid-rib, elliptic lanceolate, strongly folded ; margins entire and sometimes twisted ; venation moderately prominent ; tip acute to sub-acuminate ; base acute ; emerging leaves eve green, immature growing leaves eve green with slight pinkish tinge turning grass green.

*Inflorescence* : Small to medium, broadly pyramidal, chalet red, sparsely puberulent ; stamens smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Small to medium, roundish ; base rounded ; stalk inserted squarely ; cavity absent to slight ; shoulders equal and level, ventral shoulder rounded, dorsal shoulder ending in a moderate curve ; beak absent to a point ; sinus absent to slight ; apex rounded ; skin thin to medium thick, smooth, saffron yellow with a blush of pirat red on the shoulders ; dots small and moderately distant, flush to moderately submerged ; flesh firm to soft, moderately fibrous, cadmium yellow ; flavour delightful to aromatic ; taste moderately sweet ; juice moderately abundant.

*Stone* : Small, oval, moderately fibrous ; fibres soft to medium, short all over and medium on the ventral edge ; veins parallel and forked and grooved slightly.

*Fruit quality* : Medium ; bearing mid to late season ; moderately resistant to winds and hoppers ; keeping and peeling qualities moderate.



## YERRA MULGOA

The variety is indigenous to certain districts of Andhra State. The history of its origin and distribution is not known. It was propagated from the grafted trees in the orchards of Late Sri P. V. Chandal Reddy of Kodur by the Fruit Research Station, Kodur, and planted in the Variety Collection Plot which has formed in recent years the chief source of its dissemination. While the variety bears fruits of good quality, its quick susceptibility to attack of hoppers and sooty mould makes its cultivation uneconomical.

*Tree* : Medium, slow growing, spreading, unproductive to medium productive, uncertain bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Small to medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, slightly folded ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging leaves cadmium orange, immature growing leaves claret brown turning orchre red.

*Inflorescence* : Medium, conical, acajou red, densely puberulent ; stamens equal and parallel to pistil ; staminodes poorly developed.

*Fruit* : Large, ovate roundish ; base slightly flattened ; stalk inserted squarely ; cavity shallow ; shoulders equal, level and rounded ; beak absent ; sinus slight to shallow ; apex rounded ; skin medium thick, smooth to inclined to be rough, cadmium yellow with a blush of coral red on shoulders ; dots small, moderately distant, flush with the surface ; flesh soft, fibreless, primuline yellow ; flavour pleasant ; taste sweet ; juice moderate to abundant.

*Stone* : Medium, oblong oval ; covered with short and soft fibre all over ; veins forked and slightly raised.

*Fruit quality* : Good ; bearing poor to medium ; mid-season ; highly susceptible to hoppers and winds ; keeping and peeling qualities medium.



YERRA MULGOA



ZAFRAN

## ZAFRAN

The variety derives its name from the colour of the fruit which resembles that of *Zafran* or Saffron. It possesses good fruit qualities and deserves to be introduced in other mango growing areas also. At present, it is mostly confined to Uttar Pradesh.

*Tree* : Medium, moderately vigorous, spreading, productive, regular bearing ; top rounded ; trunk medium ; shoots medium thick.

*Leaves* : Medium, spreading, slightly reflexed on the mid-rib, oval lanceolate, flat ; margins entire ; venation moderately prominent ; tip acute ; base acute ; emerging leaves course green, immature growing leaves lime green turning absinth green.

*Inflorescence* : Medium, conical, light jasper, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes well developed.

*Fruit* : Medium, oval to oblong oval ; base rounded ; stalk inserted squarely ; cavity absent to slight ; shoulders equal and level, ventral slightly higher than dorsal, ventral shoulder rounded, dorsal shoulder ending in a long curve ; beak distinct to slightly prominent ; sinus slight to shallow ; apex broadly pointed to rounded ; skin medium thick, smooth to rough, golden glow with a blush of jasper red on shoulders ; dots medium, close, flush with the surface ; flesh firm, fibreless, primuline yellow ; flavour delightful ; taste very sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered with fairly dense, short and soft fibre all over ; veins parallel and slightly depressed.

*Fruit quality* : Very good ; bearing early to mid-season ; moderately resistant to hoppers and fairly resistant to winds ; keeping-quality medium ; peeling-quality good.



## ZARDALU

The variety is indigenous to Murshidabad in West Bengal. It is believed to owe its origin to a superior chance-seedling, selected grafts of which were cultivated by the Nawab of Murshidabad. The grafts are reported to have been presented by the Nawab to Maharaja Rahmat Ali Khan Bahadur of Khadakpur in Bihar, from whose orchards it spread in different parts of Bihar State and the neighbouring mango regions in Uttar Pradesh. This variety deserves wider introduction in other mango growing regions also. It possesses exceptional fruit qualities, has a fairly heavy bearing nature, and deserves to be planted as a dual-purpose variety. It derives its name from *Zardalu*, a dry fruit popular in North West Frontier Province and Sind in Pakistan, owing to similarity of shape and quality.

*Tree* : Medium, moderately vigorous, spreading, medium to productive, regular bearing ; top rounded ; trunk medium to slender ; shoots medium to thick.

*Leaves* : Medium, spreading, inclined to be crinkled ; margins entire ; venation moderately prominent ; tip sub-acuminate ; base acute ; emerging and immature growing leaves deep chrysolite green.

*Inflorescence* : Medium to large, conical, apricot buff, moderately puberulent ; stamens unequal, smaller than pistil and oblique to it ; staminodes poorly developed.

*Fruit* : Medium, oblong to obliquely oblong ; base obliquely rounded ; stalk inserted obliquely ; cavity absent to slight ; shoulders unequal, ventral higher and broader than dorsal, ventral shoulder rising and then rounded, dorsal shoulder ending in a long curve ; beak distinct to prominent ; sinus slight ; apex broadly pointed ; skin thin, smooth to inclined to be rough, golden yellow ; dots small, moderately distant, flush with the surface ; flesh firm to soft, sparingly fibrous, close to the skin, capucine yellow ; flavour very pleasant to delightful ; taste sweet ; juice moderately abundant.

*Stone* : Medium, oblong ; covered all over with dense, short and soft fibre ; veins forked and slightly depressed.

*Fruit quality* : Very good ; bearing medium to heavy ; early to mid-season ; moderately resistant to winds and hoppers, keeping and peeling qualities medium.



ZARDALU



Part II

MANGO CULTURE





## CHAPTER ONE

### CULTIVATION

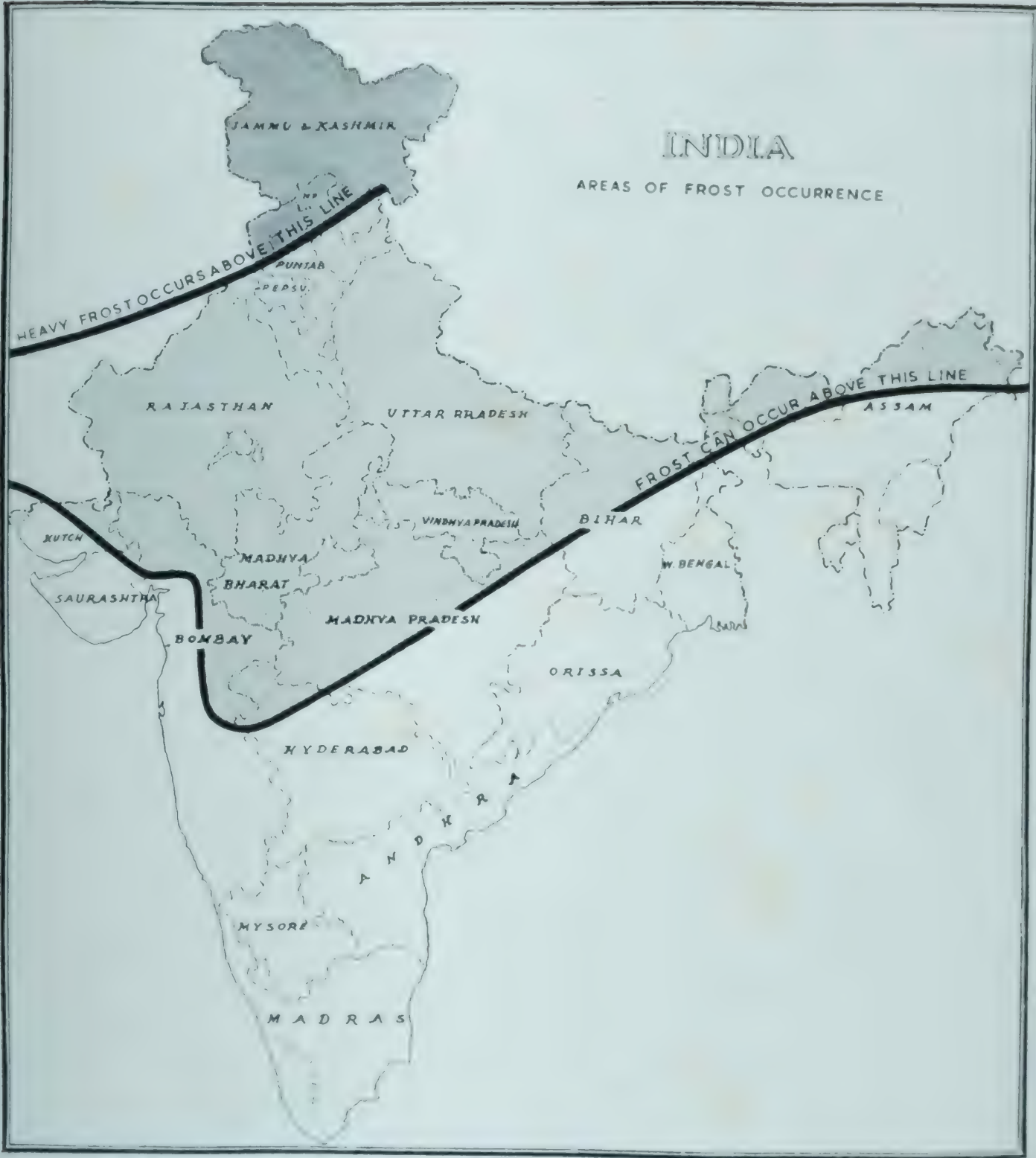
THE mango is grown in almost all parts of India, and is by far the most important commercial fruit crop of the country. However, its cultivation shows particular concentration along the foot of the Himalayas and the coastal regions. The biggest producer is the State of Uttar Pradesh where 5,38,383 acres are under mango trees. This acreage constitutes about 90 per cent of the total area under fruits in that State. Bihar comes second in this respect, followed closely by West Bengal. Other areas in the order of importance are Andhra and the West Coast of India comprising Gujerat, Konkan, Malabar and Travancore-Cochin.

The following table gives the acreage under mango in different States of India in 1955:

<i>State</i>	<i>Acreage</i>	<i>State</i>	<i>Acreage</i>
Andhra	1,60,917	Madhya Bharat	5,000
Assam	—	Mysore	26,105
Bihar	2,17,517	PEPSU	3,441
Bombay	31,889	Saurashtra	1,200
Madhya Pradesh	44,397	Travancore-Cochin	23,031
Madras	1,00,459	Bhopal	3,206
Orissa	78,000	Coorg	62
Punjab (I)	18,662	Himachal Pradesh	122
Uttar Pradesh	5,38,383	Kutch	3,500
West Bengal	1,80,866	Vindhya Pradesh	2,031
Hyderabad	20,474	Jammu & Kashmir	132
Total for India		14,59,394	

There is a great scope for further expansion of the area under this crop.

Even though the mango has been grown in India from times immemorial, much attention has not been given to the question of its proper cultivation. It has been a victim of the fallacy that trees, unlike field crops, need no attention after they are once planted, and that any kind



## CULTIVATION

of soil is good enough for them. It is also usual to find in the old orchards that manuring and irrigation are neglected completely. The trees in such orchards, though not thriving, have not withered, proving amply that the mango can withstand all 'abuses' splendidly. With judicious manuring and irrigation it should be possible to revive these trees.

The cultivation of mango is beset with certain problems. The orchard is laborious to start : the mortality of grafts is high after planting and the tree takes long to come to bearing. However, the bearing span is also long, and the tree gives high returns once it is established.

In the commercial cultivation of mango, the importance of selecting proper varieties cannot be over-emphasised. Since the trees come to bearing after many years, the results of poor selection come to light only after much effort and money have been spent. This also stresses the need for purchasing plants from reliable sources. The varieties selected should be suited to the locality where they are desired to be planted and should have a good market. A small number of well-known varieties should be planted. These should have good bearing capacity, ought to be free from the defect of alternate bearing as far as possible, and should possess good fruit and keeping qualities. Some varieties should be early bearing, some mid-season and others late, so that a regular supply of fruit can be ensured. This consideration acquires particular significance when we think of cultivating foreign markets.

### Climate

The mango is well adapted to tropical and sub-tropical climate. It flourishes in a mean shade-temperature of about 80°F and cannot stand severe frost, especially when the tree is young. The good varieties thrive in places with good rainfall (30" to 150" per annum) and a hot dry season. The distribution of rainfall is more important than its quantum. Cloudy and rainy weather at the time of flowering interferes with pollination which is done by flies and bees, and is, therefore, undesirable. Rain at this stage not only diminishes insect activity which is the chief source of pollination, but also injures the stigma and causes mildew and other fungus diseases. This problem is particularly serious in the eastern districts of Bombay State (Cheema *et al*, 1954). Dry period before blossoming is conducive to profuse flowering. Strong winds and cyclones during the fruiting season can play havoc and blow away the fruit completely. Heavy rain at the time of ripening also causes considerable damage and is mainly res-



## THE MANGO

possible for the failure of late ripening varieties on the West Coast of India.

Climate has a definite influence on the quality of the fruit. Consequently, each locality has its own choice varieties which may not do well in other places.

### Soil

The soil requirements of mango are not exacting. If the soil is well-drained and deep, it is all right. Moreover, if the sub-soil is good, even a poor surface soil will do. High percentage of humus in the soil is desirable, especially for the development of good fruit quality. The loamy alluvial soils of the Indo-Gangetic plain are ideal. Burns and Prayag (1920) hold that the red soils of Dharwar, derived primarily from haematitic quartzite and the red laterite soils of Belgaum, Ratnagiri and Goa, are pre-eminently suited to mango. In places which have heavy rainfall, the black cotton soils get water-logged and are not suitable. The extremely sandy soils, the shallow rocky soils, the water-logged soils, and the alkaline or calcareous soils are not suitable for mango cultivation.

## PROPAGATION

From times immemorial the mango has been propagated through seed. This natural method of propagation, though responsible for the production of most of our existing varieties, is unable to perpetuate them. Vegetative propagation is a necessity for true to type propagation in an open pollinated plant like the mango. However, in certain countries, such as the Philippines and Cuba, the varieties grown are polyembryonic, and in their case the seedlings come true to the mother plant. However, in India, almost all the varieties of commercial importance are monoembryonic. On the West Coast of India about ten polyembryonic varieties have been discovered, but these have little commercial importance. The established method of vegetative propagation of the mango consists in marching. Other methods like budding, grafting, and *gootee* (marcotting) have also been found successful in recent experiments.

### Raising of Seedlings

For purposes of raising healthy and vigorous rootstock seedlings, only plump, well-developed and healthy stones from prolific trees of hardy

## CULTIVATION

varieties should be used. It has been found that the seeds retain their viability only for a few weeks after the fruit is harvested. They should, therefore, be sown from fresh fruit without any delay. It has been reported by Joshi (1952) that the germination of the mango seed falls from 80% to 12% if its sowing is delayed by two months after harvesting. It is best to take seeds from only those fruits which have ripened on the tree itself. Shrivelled and underdeveloped seeds should be discarded. Before sowing, the seeds should be cleaned of all pulp.

The best time for sowing the seed is when the monsoon commences or is about to commence. In South India, June is the best month for sowing and in North India it is early July. The seeds can be sown in pots or in beds. Two or three seeds are sown in each pot, about one inch deep. The seed beds, where these are employed, should be well prepared and manured. It has been found that sowing of seeds with plumule up will encourage the development of a straight stem and tap root. It means that seeds should be sown with their back to the ground, that is, with the suture facing up. The common practice of sowing the seeds flat should be discouraged. Well drained loose soil should be preferred for the nursery.

The soil should be copiously irrigated after sowing. Germination will take place after about a month of sowing. As most of the Indian varieties are monoembryonic, one seedling will arise from each seed. Sometimes one may come across more than one branch shooting up, but in such cases the branches generally spring from below the soil surface. All the weak shoots should be clipped off, and the weaker seedlings rouged out. Only strong seedlings, each with one branch, should be allowed to grow.

To get straight seedlings, it is necessary to get good tilth in beds or pots. Unsuitable soil and uncared for seed bed will give rise to crooked stems and tap root. Such plants are unfit for use as rootstock.

Mango seedlings, raised in nursery beds, should be potted when they are 9 months to one year old. Their long tap roots should be cut back suitably while potting. The seedlings growing in pots may be lifted when about 8 months old and potted in bigger pots. Potting should be done when the atmospheric humidity is high. These potted seedlings could then be inarched or budded. They should be hand-watered and nursed well until the grafted plants become ready to be planted in the field.

### **Inarching**

This is a method by which a superior variety is grafted on to a seed-



## THE MANGO

ling rootstock. The rootstock seedlings are raised from seed in a pot as described above. When the seedling is about a year old and has attained thickness of a lead pencil ( $\frac{1}{4}$  to  $\frac{1}{2}$  inch), the pot is placed close to the scion shoot of the mother tree. For this purpose a platform or a grafting stand or cleft ends of bamboo or wooden poles planted in the ground are used. In case the scion shoot is low enough, the pot can be kept on the ground itself. When a large number of grafts are to be raised, some nurserymen plant the trees close to each other with a spacing of ten to twelve feet in between the rows. The trees are topped and their limbs pruned severely so as to develop low-headed bushy trees. In such cases, the potted seedlings can be placed right on the ground and grafted to low hanging scion shoots. The pots are sometimes buried in the ground so that water can be provided to them with ease and economy. Stock seedlings may also be grown directly in the ground under the scion tree. However, a serious defect in this method (from the grower's point of view) is that since the scion trees do not bear any fruit, the productive capacity of the grafts raised from such scion parents cannot be known for certain.

The best time to inarch is when the stock and scion are in active vigorous growth. The sap within the tissues of the tree flows freely at this time, and helps in quick healing of the wounds. A hot and dry season or very wet season is not suitable for this work. Inarching is possible during the period from July to February. July to September is the best period, with October-December period coming next.

The selected potted seedling is brought close to the scion branch of the same thickness. Generally, a one year-old terminal shoot of the scion tree, about  $1\frac{1}{2}$  to  $2\frac{1}{2}$  feet in length is the most suitable. The scion branch is bent in an arch to approach the potted seedling. The places on the stock and scion where they touch each other are then marked. A strip of bark about  $2\frac{1}{2}$ " to 3" long with a small layer of wood attached to it should first be removed from the marked place. This place should ordinarily be at a height of 9 to 12 inches from the soil surface. A similar strip is then removed from the scion shoot at the marked place. For cutting the strips, a sharp knife should be used and the cuts given in such a way that the two shoots, the stock and the scion, brought together fit well, leaving no gap. The two sliced surfaces are placed together face to face so that the cambium layers in both are in perfect contact. These are then tied with raffia, banana fibre, waxed cloth or twine. Paraffined cloth or grafting wax is then applied over the union. Some people use a poultice or a mixture of

## CULTIVATION

red earth or loam, clay, sand, and cow dung in equal quantities for covering the graft union. Grafting wax is prepared by mixing rosin, bees' wax and tallow or linseed oil. After the inarching operation, the seedling is kept properly watered for at least two months.

When the union is complete, the scion is separated from the mother tree just below the point of union. This should be done in stages. A cut about an inch below the union and half way through the scion shoot is given about a month after inarching. Another cut is given on the opposite side an inch further down about a fortnight before the final separation. At the same time, the stock shoot is given a similar cut a little above the point of union. In another fortnight or a month, the cuts should be extended to completely separate out the scion shoots from the mother tree, and the seedling top removed. The cut surface of the stock and the scion in the graft should be smeared with white lead or a thin layer of tar. This prevents decay, and keeps away the borers. The detached grafts should be kept in partial or complete shade for at least a month or two (preferably six months) before these are planted in the field.

After about one to three months of separation, the mud poultice and the rest of the bandages around the graft-joint should be removed. The potted plants should be watered regularly from the date of inarching till they are planted in the field. Watering will be necessary daily in dry periods and less frequently at other times. Grafted plants are generally ready for planting from three months to a year from the time of separation from the scion tree. It would thus take about two years from the time the seeds are sown for raising rootstocks till the grafts are ready for planting in the field.

An easy and cheap method of grafting mangoes has been devised by Garg (1954). The mango seedlings, preferably a year old, are dug out from the nursery beds. Balls of earth are kept attached to their roots. Water is sprinkled over these balls of earth so that they do not become loose. After a day or two when the earth lumps are hard enough to be handled, the surplus earth is removed from the roots, leaving only the earth containing the main roots which is covered with fibre, moss or soft hay and tied with cotton thread. The treated balls of the seedlings are dipped in water for about half a minute and stored close together in an upright position for about 8 days. If during that period the seedling balls become dry, they should be dipped in water again. Alkathene film or





A NEW METHOD OF INARCHING

## CULTIVATION

another similar film is then cut into pieces about 8" × 12" and made into bags lengthwise. The moist balls of the seedlings are put in these bags. More moss or hay is then added in the bags to make them snugly covered. The open mouth of the bag is closed with string. Another band of string is tied round the middle of the balls. Every precaution in covering the balls with the film is taken, so that air, sun-rays and rain water do not enter. These seedlings are now hung on the mother trees, close to suitable branches for inarching, which is done in the usual manner. The union takes place in about six weeks. The grafts are detached gradually as usual, in another four weeks. After detaching them from the mother trees, the grafts are planted in pots or ground in a cool and shady place.

### Budding

Mango budding has been attempted in several countries. It is reported to have given some success in Queensland, Florida, the Philippines, Java, Ceylon and Egypt. In India budding has been adopted lately as a method of propagating the mango. The stock seedlings are grown in the nursery beds and budded when they are about one year old.

Budding consists of placing a piece of bark taken from the scion, with a single bud in it, in contact with the stem of the stock seedling under the bark. Branches of the variety desired to be propagated can be brought from far off places by packing them in moist sphagnum moss, saw-dust or in a thermos. It has been found that the bud stick, wrapped in moist sphagnum moss, can be preserved in green condition for about two to three weeks. Seedlings that grow from the mango stones sown in June-July are ready for budding in the following March, i.e. when they are nearly nine months old. Spring and summer are the best seasons for budding, provided good irrigation is given to the seedlings. From the bud stick all the leaves are removed, retaining only the petioles attached to the bud stick.

#### *Forkert method of budding*

The Forkert method of budding was first perfected in Java to bud rubber plants, in the case of which other methods of budding had failed. This is the only successful method of budding mango in that country and also in Ceylon. In India it has been tried and perfected by Gandhi (1955) at the Ganeshkhind Fruit Experiment Station, Poona. In this method the 'bud stick' or 'bud wood' is not the terminal shoot of the previous



## THE MANGO

season's growth but the growth just below it, which is older by a year. The buds on the bud stick should be swollen and prominent. A rectangular patch of bark, about  $1\frac{1}{4}$ " to  $1\frac{1}{2}$ " long, with the bud in its centre, is removed along with a thin layer of wood attached to it. The wood chip is peeled off gently with the finger nails, and the leaf stalk is also trimmed off close to the bark. The stock should be operated by pulling out a rectangular panel of bark from a smooth place on the stem about four to six inches from the ground. This is done by first giving a transverse cut in the bark and then two vertical cuts extending down from the ends of the first cut. The cut bark of the panel, which should be a little larger than the size of the scion bud, is then pulled down by hand in one strip, so as to expose the wood below. The bud is then gently placed on the panel in the angle between the flap and wood of the stock. This is then completely bandaged by means of a waxed tape so as not to allow water or air to get into the joint. To ensure success, the whole operation should be done swiftly with a knife without any loss of time and without damaging the cambium.

After three weeks, the bandage is removed and if the bud appears green, fresh and united with the stock, the flap of bark on the stock is cut away below the bud. The bud is again tied up leaving its centre uncovered, so as to expose the growing point.

The bud will sprout in about three weeks after it has been exposed. The part of the stock above the bud should then be cut and the bandage removed. In Bombay State it has been found that plants budded in August or September usually make one or two vigorous flushes of growth during the warm weather in October and then remain dormant throughout the winter. With the advent of the rains they start growing vigorously, and by the time of next monsoon they attain a height of four feet and become fit to be planted in the field in their permanent places.

According to Gandhi (1955) the Forkert method of budding should give much better results than the shield method as, in the former, the cambium is not injured while operating on the stock, and remains protected from desiccation due to complete wrapping of the operated parts with the waxed tape. In the shield method, he states, there is every likelihood of the cambium being scratched by an inexperienced operator. Also, the bud being only partially covered by the bandage, air getting into the operated parts desiccates the cambium.

## CULTIVATION

### *Shield budding*

Shield budding in mango is said to be more successful in some places than bark-grafting or patch-budding, while the modified Forkert method has been found better in other places.

Shield budding is commonly employed for the budding of oranges. The bud is removed from a selected scion parent with a small piece of wood attached to it. A 'T' or inverted 'T' shaped incision is made in the rootstock stem. The bark or the rootstock stem is raised and the bud is then slipped in place. This is then bandaged by means of waxed cloth or tape. Subsequent treatment of the budded plants is the same as employed in Forkert budding.

### *Patch budding*

Patch budding consists of inserting a rectangular bud in a corresponding cut in the bark of the stock plant. A thick stock seedling is selected and a patch of bark is removed from the trunk of the seedling. Later, a patch bud exactly of the size that would fit into the exposed area is removed and fitted in. A bandage is tied to protect this bud. The stock seedling is, thereafter, beheaded above the bud in stages to promote the sprouting of the inserted bud.

This method has given about 10 to 15% success in South India.

### *Budding in situ*

Lal Singh and Khan (1942) tried budding of mango seedlings *in situ*. This was resorted to firstly because the success was better with 2-3 year old seedlings than with younger plants and secondly because the grown-up seedlings did not transplant well after budding. This method was practised on field scale to establish mango plantation. Budding was also used to top-work inferior seedling trees.

## **Grafting**

Singh (1951) evolved a successful technique at Saharanpur for grafting mangoes in only eight weeks' time. Mango stones were planted early in July, and started germinating at the end of the month. After 30 days the seedlings were 1 ft. high and  $\frac{1}{4}$ "— $\frac{1}{2}$ " in diameter. Seedlings including sprouting stones were lifted and the soil clinging to the stones was removed. The stones were covered with wet sphagnum moss  $\frac{1}{2}$ " thick, held in place by a thin string. These were taken to the parent tree and inarched

with new shoots of the same thickness in early September. Union took place rapidly, and at the end of the month the grafts were detached from the mother plant and potted. 80% success was achieved.

### *Root grafting*

It has recently been shown at Kodur (Andhra) that grafting direct to the root piece of the seedling is possible in mangoes. This method is similar to the method of bench grafting practised in Europe and America on apples, pears and grape vines. The only difference is that in this case a piece of the root, about two inches in length, is exposed and is grafted to the scion shoot.

Root grafting produces grafts of greater uniformity in growth and bearing habit than the inarched plants, in the case of which a portion of the stem piece of the rootstock is retained. However, this method being more tedious and difficult cannot be practised on a commercial scale. It is useful for raising uniform plant material for experimental purposes.

### **Hormones and Rooting**

Singh and Teotia (1951) conducted some experiments on the rooting of mango cuttings with hormones at Kanpur. They tried  $\beta$  indoleacetic acid, naphthaleneacetic acid, phenyleacetic acid, and  $\beta$  indolebutric acid to marcot two varieties of mango. One per cent NAA induced 100% rooting in *Dusehri*, while 2% NAA gave the highest percentage of rooting (70%) in *Langra*. Rainy season was found the best time for this operation.

### **Air Layering**

The air layering, *gootee* or marcotting of mango, is an improvement on the conventional method of inarching. It holds promise of quick and cheap propagation.

In this method a shoot about  $\frac{1}{4}$ " to  $\frac{1}{2}$ " thick is taken and a ring of bark  $1\frac{1}{2}$ " to 2" broad is removed from all round the shoot at a place about 1–1 $\frac{1}{2}$  ft. below the growing point. The ringed portion of the shoot is wrapped in wet moss and covered with several folds of a plastic wrap. Plastic wraps like Alkathene, permit exchange of gases without letting moisture escape, and thus obviate the necessity of watering the *gootee*. Singh (1954) has tried the application of various concentrations of  $\alpha$  naphthaleneacetic acid (NAA) and  $\beta$  indoleacetic acid (IAA).





AIR LAYERING

to the upper edge of the bark before wrapping up the *gootee*. The results are encouraging. Up to 37% rooting has been obtained with 1% NAA.

### **Top-working**

Most of the mango trees found in our country are seedling trees and bear poor and inferior fruit. Trees of poor quality can be converted into superior quality trees by top-working operation. This method has been tried with success even on a big scale in the Punjab and Uttar Pradesh and recently in Pachmari (Madhya Pradesh).

### *Side grafting*

Side grafting is a successful method of top-working mature mango trees. The operation is more successful on trees that have smooth bark than on those whose bark is split or gnarled. The method proves successful on fairly old trees. Cloudy days, humid atmosphere, and absence of strong winds, rains and excessive heat, during the few days immediately following the operation, are favourable. Monsoon season is, therefore, best suited for this work.

After heading back the main limbs of the old tree, each limb is side-grafted individually. A triangular patch of bark is removed from the trunk with a sharp knife, and carefully kept. Two parallel slits, each eight to ten inches long, are made vertically and downwards in the bark immediately below the lower corners of the triangular patch. The bark between the two slits is raised carefully (beginning from the upper side) with the ivory blade of a budding knife or with a steel blade. Well matured terminal shoots of the previous season's growth are defoliated and cut 8 to 9 inches in length and as thick as a lead pencil. One end of the scion shoot is trimmed into a wedge-shape and pushed firmly under the flap of the bark. The triangular piece of bark is fitted into its original position, and bound with twine. Grafting wax is applied over the bandage. The scion shoots should be inserted all round the tree at different heights. Successful grafts sprout in about four to six weeks, while those which have failed to unite, dry up or show signs of withering during this period. When some of the shoots have been grafted successfully the whole of the inferior top should be cut away gradually. The cut surfaces should be treated with a disinfectant, such as coal tar. The grafting bandages and the wax are removed in about three months. After about two or three years these trees will bear fruit.

## CULTIVATION

Naik (1941) has reported encouraging results in trials carried out at the Fruit Research Station, Kodur, with this method. He tried this method in the case of four leading commercial varieties *Khader*, *Neelum*, *Allumpur Baneshan* and *Banganpalli* in different seasons at the same station. The scion shoots used in these trials were from the terminal parts of one year old shoots and were round, cylindrical, mature and with distinctly formed terminal and axillary buds. Analysis of the 'take' revealed a hundred per cent success in the case of *Khader* in all the months. With *Neelum* the successful 'take' was 90% in October and 100% in November. Next came *Allumpur Baneshan* with 80% and 90% success in October and November respectively, followed by *Banganpalli* with 50% success in October and 100% success in November.

### *Crown grafting*

This is a comparatively cheaper method. The main branches of a large tree to be top-worked, are cut back within three to four feet from the top of the trunk. Branches growing vertically are better suited for crown grafting. The cut ends of the main limbs are grafted with scions of the desired variety by cleft grafting.

Gandhi (1955) states that to get more success with crown grafting, humid conditions should be produced. To maintain this humidity, he has evolved a simple device consisting of a straw board case constructed around the operated part, which is filled with moist sawdust up to the top buds of the scion and is provided with a glass roof to admit light. The saw-dust has to be kept constantly moist by watering it on alternate days till the graft is established. Care has also to be taken to irrigate the stock trees every week, so that they remain in a vigorous sappy condition.

## PLANTING

Before planting the orchard, it is necessary to plant the windbreaks. They protect fruit trees from the desiccating hot winds, cyclones, frost etc., that would otherwise cause considerable damage to the crop and the trees. The windbreak trees should be planted on that side of the orchard from which winds generally come. The effectiveness of the windbreak extends to a distance of about four to eight times its height. In a large orchard, it becomes necessary to plant more than one row of windbreaks. Hardy, quick-growing and tall trees suited to local conditions should be



## THE MANGO

used for this purpose. Trees like *Shisham* (*Dalbergia sissoo*), *Eucalyptus* spp., *Jaman* (*Syzygium cumini*), Red Sanders (*Pterocarpus santalinus*), *Millingtonia hortensis*, *Erythrina indica* and *Casurina equisetifolia* are suitable. Even seedling mangoes and bamboo can be employed as wind-break trees. It is preferable to plant short and tall trees, alternately in one row of windbreak.

The selection of good grafts for planting is most important. Plants of a suitable variety should be obtained from a reliable source. They should not be freshly detached from the mother tree and should be healthy, erect, with strong union and one main branch, and in a large enough pot. If the graft is not planted within six months after detachment, it should be repotted into larger pots every six months, lest the roots become pot bound.

The planting is done according to the square system or the hexagonal system. The planting distance depends on the variety, the soil and the climatic conditions. In most places a distance of 40' is adequate. Varieties like the *Dusheri* which do not grow into large trees should be planted about 35' apart, while those like the *Langra* should be planted about 45' apart. In fertile soils and favourable climatic conditions the planting distance should be greater. For example, in the coastal regions of Gujarat and Ratnagiri, the trees are spaced up to 60' apart. The seedling trees usually attain large size, requiring wider spacing.

Before planting, pits about 3'  $\times$  3'  $\times$  3' are dug at the site of each tree and kept open for about a month. The pits should be refilled with top soil mixed with 100 lbs. of bonemeal and 10 lbs. of wood ashes (Burns and Prayag, 1920). In drier regions, where white ants are a problem, the farmyard manure, which attracts them, should be replaced by 5 lbs of *neem* or *mohua* cake. Naik (1949) recommends a dose of 10 to 20 lbs. of well-rotted farmyard manure per pit. To combat white ant trouble he recommends that the manure should be added 6 to 12 months before planting, or applied the same period after planting. Cheema *et al* (1954) also support this view, and add that fresh manure may cause too much heat in the soil and thus damage the tender rootlets of mango. The dose of manure per pit recommended by them is 25 lbs. of farmyard manure, one and a half pounds of bonemeal, and two and a half pounds of wood ashes. According to Gandhi (1955), in Ratnagiri area, the pits are filled with alternate layers of soil and fresh green leaves. In this area the rainfall is heavy, which causes the leaves to rot quickly, and there is no danger of white-ant attack.

## CULTIVATION

When the pits are filled, the soil should be higher than the adjoining ground. They should either be filled before the monsoon starts or should be irrigated after filling. The planting is done about two weeks later, when the earth in the pit has settled so that the plant will not sink down after planting.

The planting should be done during the monsoons. If the rainfall is heavy, it should be done towards the end of the monsoon, since there is the danger of the plants dying due to excessive water. In South India, the planting season lasts from July to November. In the North the season extends from July to August. However, it is better to do the planting after the first monsoon shower, so that the plants are established before the main showers start. The best time for planting is late evening. If the planting is done earlier in the day, the heat may damage the grafts. The plants removed from the pots are put in holes of the size of a ball in the centre of the pits and soil around them is packed firmly. A basin is made around each plant. The soil in the basin is kept sloping outward so that water does not remain in contact with the stem of the plant for long and thus cause collar rot, etc. The graft should be planted at the same depth at which it was in the pot or the nursery bed. Deeper planting results in poorer growth of the tree and also makes the bark susceptible to the attack of fungus diseases. After setting the plant into the ground, it should be watered copiously. It is a good practice to stake the plants so that they may not snap at the graft union in strong winds. The mango grafts are rather delicate, and unless they are properly cared for after planting in the field, the mortality is very high. It is particularly important to protect them against frost and hot winds by providing a thatched shelter to each tree for at least the first three years. The problem is more acute in North India.

## CULTURAL PRACTICES

For the first five years after planting, the tree should be enabled to make vigorous vegetative growth. Hence, liberal irrigation and manuring are required. No pruning whatsoever is to be done during the first three years, and the trunk should be permitted to gain girth unhampered in any way. Later, slight training to improve the framework of the tree can be done. Care should, however, be taken that the trunk is not exposed to the sun by careless pruning, and the crown is not raised more than three



feet above the ground level and thus exposed to the danger of sunburn. Only crossed and crowded branches which are not exposed to sunlight should be removed. No pruning is better than too much pruning. However, any shoots arising from the stock, and all blossoms appearing during the first four years should be removed.

The available experimental data on the various cultural requirements of the mango including manuring and irrigation are inadequate, and most of the recommendations made by various authorities are based on limited observations. Mango is ordinarily not irrigated after the first three or four years. This is not a desirable practice. Results can be improved considerably with judicious irrigation and manuring. During the first three or four years frequent irrigation during the dry periods, including the dry spells within the monsoon, are recommended. Some authorities have recommended irrigation as often as every two or three days during the first hot dry season after planting. This however, seems to be too frequent. Copious irrigation at greater intervals is to be preferred to frequent wetting of the surface soil. Naik (1949) recommends that irrigation should be given only when the top nine inches of soil have gone dry. The method of irrigation at this stage is the modified basin system. Where irrigation facilities are not available as in Ratnagiri, watering is done by hand. Higgins (1906) states that the mango requires from 50 to 70 inches of irrigation per year, heaviest irrigation being needed from the time the flower buds are about to open till the fruiting is over, and that irrigation should be restricted for a period of two or three months prior to flowering.

Some authorities recommend the stopping of all irrigation between the time of fruit harvest and blossoming. The underlying idea is that the vegetative growth during this period should be restricted in order to encourage fruit-bud formation. However, some others recommend one or two irrigations. Irrigation of bearing trees in the plains is done by flooding them with water.

It is a good practice to grow an inter-crop in a young mango orchard. This gives some income during the non-bearing period of the orchard, and also indirectly assures regular irrigation, manuring and culture of the orchard. It also maintains humidity in the orchard during the dry periods. Any vegetable, or a leguminous crop, like gram, *berseem*, or peas can be grown as an inter-crop. In fact, any crop which does not grow too tall or requires too much irrigation can be grown. Filler trees can also be put between mango trees. Care should be taken not to plant these too close

## CULTIVATION

to the mango trees. They have to be uprooted after about ten years, before they start competing with the mango trees. Peach, plum, *phalsa*, papaya, pineapple, dwarf varieties of bananas etc. can be used as fillers. At least two cultivations should be given every year. Green manuring of the bearing orchard by raising a leguminous crop and ploughing it under during the rains is desirable.

Manuring of bearing mango orchards is almost unknown in India. Even though very little experimental data are available on the subject, it seems certain that manuring is highly beneficial. The mango tree can remain undernourished for many years without dying, and can be revived again by suitable cultural practices. Apparently it is able to build up carbohydrate reserves slowly under a low level of nutrition. The problem of manuring the mango is intimately connected with its periodicity of bearing. The doses and the time of application of fertilizers should be planned in such a way that the tree gives a good crop regularly every year.

For trees of non-bearing age in Florida, Ruehle (Florida Mango Forum 1951) recommends a fertilizer mixture containing 4-5% nitrogen, 7-9% phosphoric acid and 1.5% water-soluble magnesium, with 30-40% of the nitrogen in organic form. One-fourth to half a pound of this mixture per tree is recommended for application three to four weeks after planting, and once every month except from November to January, for the first year. During the second and third years it is to be applied once every two months, the quantity of the fertilizer being gradually increased to 4 lbs. The fertilization of bearing trees has been recommended to be split in three doses. Pre-bloom application of 1/10 lb. of nitrogen per tree in the form of artificial fertilizer such as ammonium sulphate followed by irrigation is to be done when the panicles begin to elongate. The second application is done a month later in spring. A mixture similar to the one recommended for non-bearing trees, but with potash and magnesium increased to 5-8% and 3% respectively, is recommended. It is to be applied at the rate of 1 lb. per tree. The third application is made in the beginning of the rainy season. The spring mixture is modified in respect of nitrogen in the organic form which is increased to 50%. If greater vegetative growth is needed, the dose can be increased to 1½ lbs.

All workers agree that in mature trees too vigorous a growth interferes with their fruitfulness. Popenoe (1920) went to the extent of saying that farmyard manure was not suited to bearing mangoes. However, Sen and Roy (1945) concluded on the basis of experiments done in Bihar, that



the supply of nitrogen is necessary. They found that it determines the growth and controls the uptake of other elements i.e. phosphoric acid and potash. However, the increase of nitrogen beyond the optimum limit causes potassium deficiency. Mango cannot stand any potash deficiency. Hence, it is important to maintain a proper balance between nitrogen and potash. The phosphate requirement is much lower than the potash requirement. Roy *et al* (1951) recommend a manurial treatment reckoned at the rate of 1.6 lbs. of nitrogen, 4 lbs. of phosphorus and 1.5 lbs. of potash per tree. These constituents may be secured with a mixture of 200 lbs. of farm-yard manure, 4 lbs. of castor cake, 10 lbs. of bone-meal, 2 lbs. of ammonium sulphate and 30 lbs. of wood ash. It is recommended that the ammonium sulphate, the quantity of which should be doubled in a year of heavy bearing, and half of the wood ash be applied in June and the rest in October. Venkataratnam (1953) recommends the application of 2 lbs. of nitrogen, and 1 lb. of phosphorus per tree in July. For the Bombay area, Burns and Prayag recommend application of 20 lbs. of farm-yard manure in the first year with an increase to 10 lbs. per year up to a maximum of 100 lbs. ; 5 lbs. of bone-meal gradually increased to 15 lbs. ; and 10 lbs. of wood ashes gradually increased to 30 lbs. Allan (1935) recommended smaller doses : farmyard manure 10 lbs. per tree increased by 5 lbs. yearly up to 55 lbs. neem cake 3 lbs., increased to a maximum of 6 lbs. ; and 3 lbs. of bone-meal and 1 lb. of sulphate of potash increased to a total of 12 lbs. of both.

According to Gandhi (1955) the best time for manuring young trees is the beginning of monsoon in tropical conditions, and two months before flowering in sub-tropical conditions. In the young plants, the manure should be put in a circular trench under the crown of the tree, leaving one foot distance around the trunk. Weak trees may be given additional 5 to 10 lbs. of ammonium sulphate.

Protection against frost is not necessary in South India. However, in the North protection of young trees from frost is important. If the young trees are not protected, they may be killed outright. Consequently it is a regular practice to cover the young trees with thatched covers for the first three or four winters. The cover is provided on all sides except the south-east side, and the thatch is brought together and tied on top. The opening on the south-east side is meant to provide sunshine. The crown of the plant should have plenty of space inside the cover and should not be smothered. Windbreaks, the growing of cover crops, and irrigation during the periods, when frost is expected, are helpful in fighting frost.

## CULTIVATION

Orchard-heating will be too expensive. The damage done to older trees is not serious. Mechanical protection of big trees of bearing age is neither possible nor necessary. The covers are removed in February. Similar covers are again put up from mid-April to the end of June to protect the plants against hot winds.

## HARVEST

The grafted trees start bearing about 5 to 7 years after planting and reach their peak in about 15 years. Their bearing life is about 50 years. On the other hand, the seedlings come into bearing after about 10 years, their bearing age is about 100 years and the yields per tree are much higher. The yield depends on many factors including the variety, the age of the tree, and the environmental conditions. Irregular bearing is another characteristic found in many varieties that has to be reckoned with. In good bearing grafted varieties the average yield in the 6th year is estimated to be 50 to 75 fruits, rising to 300 to 500 in the 10th year, and 1000 to 1500 at full maturity. The number of fruits in especially favourable years can even be as much as 3,500, weighing about 8 maunds. This applies to varieties like *Langra*, *Dusehri*, *Baneshan*, *Pairi*, *Neelum*, *Alphonso* and *Bangalora*. In shy-bearing varieties like *Jehangir* the yield may not exceed 250 fruits.

The mango crop ripens about five months after flowering. The fruiting season, therefore, follows the time of flowering. The first fruits to appear in the market in the months of February and March are from the west coast of Madras State. In the North the fruit season is rather late. In West Bengal the mango season starts from early June and in the West, it is late comparatively. In the Punjab the season starts from the first week of July.

The bulk of the crop is harvested when the fruit has matured but is still unripe. This facilitates its transportation. There is also a belief that the fruit ripened in storage acquires better flavour, quality and colour. However, the consumers of sucking mangoes in North India seem to prefer the tree-ripe fruit. It must, however, be understood that if the fruit is allowed to ripen on the tree, the damage done by birds is heavy.

The mango is delicate and perishable, and should be handled with care if it is to reach the consumer in good condition. The fruit is harvested with a long bamboo pole at the end of which a small net is attached through an iron ring. Burns and Prayag have recommended that



## THE MANGO

after harvesting the fruit should be placed on a four-inch thick layer of mango leaves in a well ventilated room for two days. After that it should be placed between layers of rice straw in a room. Ripening takes place in about a week's time. In North India, the harvested fruit is ripened by placing it between layers of wheat *bhusa* or in grain and ripening takes place in about four days. The fruit is generally harvested without the stem. No improvement in the keeping quality of the fruit has been observed if the stem is retained or coated with wax (Burns and Prayag). Wrapping the individual fruits in tissue paper is recommended for better keeping-quality by Pope (1929). Marloth (1947) has reported better success in the ripening process, if the fruit is harvested seven to ten days earlier than usual and is treated with one part of ethylene to 5,000 parts of air, at 70 — 80 F and 85—90% humidity. He also recommends that the fruits should be harvested with four inches long stems, which may be removed later at the time of packing. This is said to prevent the exudation of juice from the stem end, which spoils the appearance of the fruit. Patwardhan (1927) has found that during ripening if the temperature goes above 36 C, the fruit begins to rot very rapidly. Therefore, when the temperature reaches 33 C, the fruit should be removed from the straw and placed uncovered in a single layer on hay and allowed to ripen gradually.

If the fruit is to be transported, it is packed in baskets or boxes lined with straw after having been kept for a day subsequent to harvesting. Semi-spherical baskets are used in the North while cylindrical bamboo baskets are used in the South. Such baskets hold from 50 to 100 fruits each. In Bombay state, crates 2' x 1' x 1' are being used on a limited scale. Though the boxes are to be preferred, their cost is generally prohibitive. For overseas export of *Alphonso* from Bombay, crates 18" x 10" x 4½" holding 12 fruits in a single layer, have been found useful. Most of the mango varieties are poor keepers, but there are exceptions. The *Bangalora* (*Totapuri*) has the best keeping-quality and is shipped loose in railway wagons from Madras. It reaches the destination in good condition. *Baneshan* also has good keeping quality and is shipped regularly from Andhra State to the Delhi market. Of the superior varieties, the *Alphonso* and *Dusehri* possess the best keeping-quality.

The marketing of mango in India leaves much to be desired. The grower usually sells the entire crop on the trees to a contractor who harvests and markets it. The fruit reaches the market ungraded and improperly packed. Consequently, the losses in transit are high and the

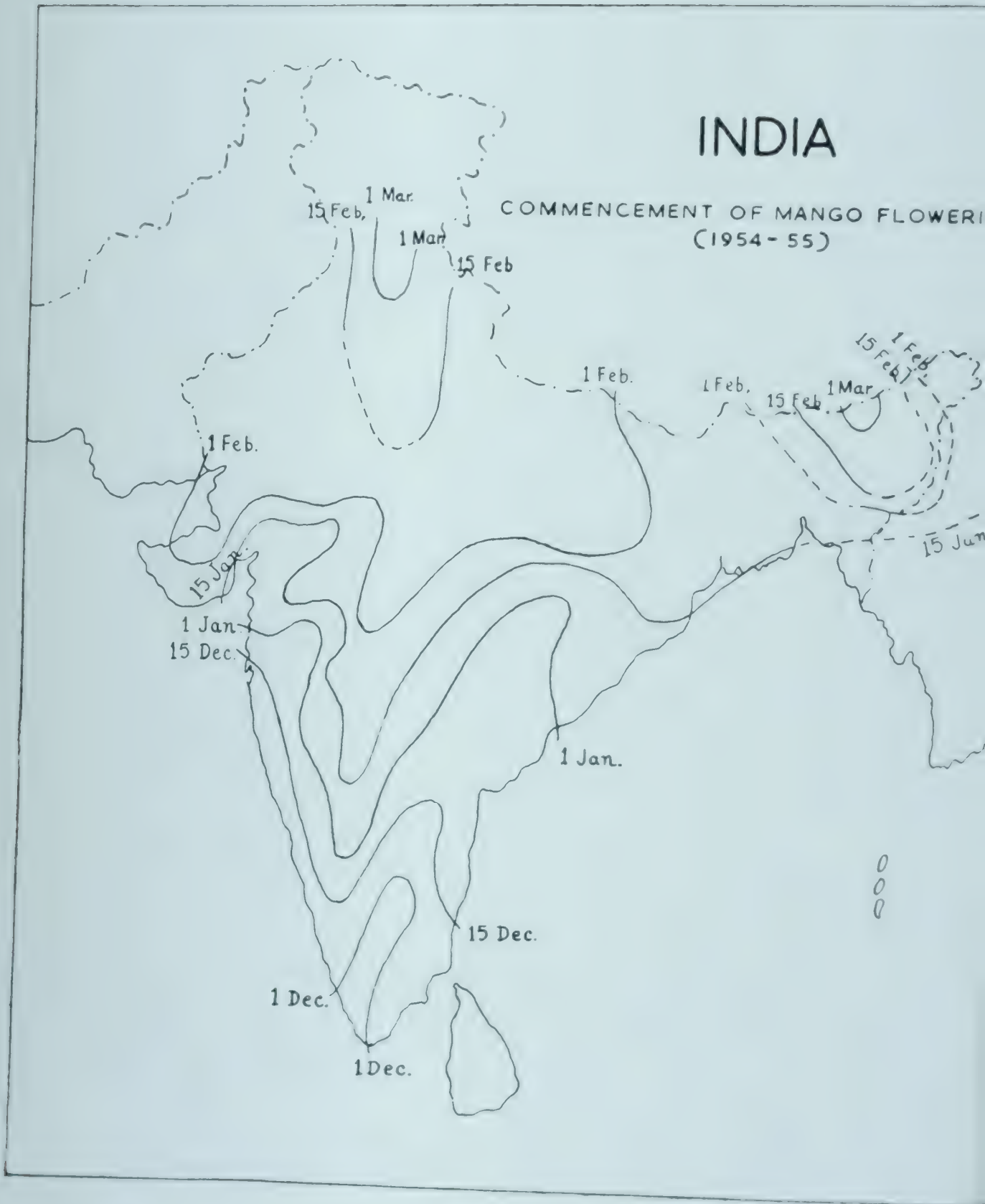
## CULTIVATION

returns low. Provision of cold storage facilities in rail-transport is very essential in India, where the climate is hot. Again, grading of the fruit is badly needed. Lately, some efforts have been made in the direction of mango grading. In Bihar the grading of *Maldah* and *Bathua* has brought a premium of Rs. -/6/- per basket, when these are sent to Calcutta. An association for this purpose was set up at Pusa (Bihar). In Uttar Pradesh *Fajri*, *Dusehri* and *Safeda* was tried and resulted in a premium of Rs. -/2/3 to Rs. 1/5/8 per 132 fruits. In Bombay, grading of *Alphonso* has given a net profit of Rs. 21/8/- per thousand fruits.

Formation of co-operative mango sales organisations of the growers is also badly needed. Such societies have been started in Ratnagiri and Dharwar in the Bombay State.

## IRREGULAR BEARING

The importance of mango as a commercial fruit crop suffers considerably owing to the periodicity of bearing of most varieties. Whether this periodicity is related to environmental conditions or derives from heredity, is not yet known with definiteness. Some varieties are more regular bearing than the others, which suggests that the periodic bearing may be a hereditary characteristic. But if this were the complete explanation, a given variety should have a definite cycle, whether biennial or otherwise of the succession of heavy and light crops. Such a cycle is, however, nowhere seen. A year of heavy cropping is followed by one or more of light harvests and environmental conditions have been found to contribute to this periodicity. Gandhi (1955) believes that alternate bearing is inherent in the mango, and that shoots producing blossoms one year will produce only vegetative growth in the following year, and *vice versa*. However, Naik (1949) does not believe that there is any inherent tendency in the mango to bear alternately, or that the shoots producing flowers during one year cannot do so during the following year. The work carried out at Sabour, Kodur and Lyallpur suggests that the periodicity of bearing can be greatly minimised by regulating cultural practices. It has been shown in Bihar that a heavy crop of mango is obtained once in six years. Wagle (1931) thinks that mango trees usually bear in alternate years, but that by suitable manuring, fairly regular cropping can be induced, especially in 10-12 years old trees. Popenoe (1927) has also expressed the view that the problem is physiological.





## CULTIVATION

Flowering in the mango is intimately connected with its vegetative growth. In Western India there are three main vegetative flushes, early in spring, in March and April, and early during the monsoons. In Bihar also there seem to be three flushes. In South India there are only two flushes—one from February to June and the other in October. In Saharanpur (U.P.) also only two flushes appear: in March-April and again in July-August. In the Punjab as many as five flushes from April to August are produced. In North India the last flush takes place by August and in South India by November. The blossoms are borne on the terminal buds, but rarely on the axillary buds. The chief factors determining the quantum of blossoms are the maturity and age of the terminal shoots at the time of flowering. Mostly, those shoots which are about eight months old and in which no growth has taken place during the four preceding months, produce flowers. Other shoots rarely blossom. However, in some cases even two months old branches have produced flowers. This is exceptional, and is caused by unexpected concentrations of food reserves in certain parts of the tree. The blossom bud differentiation begins in October or November according to Musahib-ud-din (1946) and Sen & Mallik (1940). Vegetative flushes appearing early in the season complete their growth during the summer rains attaining physiological maturity by the time of flower bud differentiation and accumulating enough reserves of carbohydrates. Thus, they are able to produce flowers in the coming season. The problem of flower bud differentiation is primarily the problem of the carbohydrate-nitrogen ratio. A high carbohydrate ratio is conducive to flower bud differentiation, while greater ratio of nitrogen produces vegetative buds. A shoot that blossoms has greater accumulation of carbohydrates and a physiological depletion of nitrogen in the tissues. In other words, it has a high carbohydrate-nitrogen ratio, which is not conducive to vegetative growth. Sen (1943) suggests that a special hormone may be connected with flower bud differentiation and that a hetero-auxin may be discovered for artificially inducing flowers. For good flowering proper supply of nitrogen and irrigation early in the previous growing season, and conditions of soil moisture and nitrogen supply which do not encourage vegetative growth during the four months preceding blossoming, are essential.

A shoot which has borne flowers in January will not put forth any growth during spring or early rains, when the fruit is harvested. The vegetative growth which it makes later, is too late for flower bud differentiation in autumn. It will, therefore, produce vegetative growth next year.



On the other hand, a shoot not producing any flower will produce vegetative flush early in the season and will produce flowers in the following year. This means that a given shoot will produce vegetative flush and flowers in alternate years. If on any tree 90% of the shoots produce flowers in one year, there will be practically no flowers in the following year. This results in bumper crops and consequent glut in the market and low prices in one year, and no crop and no income in the following year. However, in nature, such a cycle does not work with mechanical precision. After an 'off' year there may again be no crop due to frost, hot winds, insect pests or diseases. Thus one productive or 'on' year may be followed by one or more 'off' years. Once the cycle of 'on' and 'off' years is established, it is in vain to expect annual regular bearing to restart, unless heavy manuring is done two months before flowering in the 'on' year, and the blossoms are partially removed.

Sen has found that if the fruit fails to set or falls early, laterals may be produced early enough to be able to flower in the following year. Lal Singh and Khan (1939) removed part of the panicles from a flowering *Langra* tree and the result was that about 70% of the panicles produced flower next year. Sen also got some increase in the number of panicles in the 'off' year in the *Bombai* variety by removing all the panicles in the 'on' year. The problem of the control of alternate bearing, therefore, revolves around regulating the crop in the 'on' year and improving the general vigour and health of the trees.

In order to encourage regular bearing in mango the following suggestions should be given careful consideration.

## (a) *Selection of regular bearing varieties for planting*

Since all the varieties do not have an equal tendency towards irregular bearing, comparatively regular bearing varieties should be planted. It has been observed in Bihar that varieties which produce a higher percentage of axillary inflorescences are more regular bearing. *Fazli* of Bihar is a good example. *Dusehri* is also comparatively a regular bearing variety. However, the most notable regular bearers are *Neelum* and *Bangalora*. Naik observes that within any variety, difference is noticed in the bearing habits of individual trees. He suggests that only trees with marked regular bearing trait should be propagated further. Moreover, as far as possible, only the heavy bearing varieties should be planted. It has been observed that most of the shy bearers have a very small percentage of hermaphro-

dite flowers. For example, this percentage in *Jehangir* and *Allumpur Baneshan* is three and one, respectively. In mango there is no "self incompatibility" but generally only about one out of every 150 flowers fertilized matures into fruit. The rest are dropped. The yield is, therefore, bound to be poor, year after year, especially if the percentage of perfect flowers is also low. Studies on the unfruitfulness of *Haden* in Florida by Young (Florida Mango Forum 1951) have shown that in this mono-embryonic variety non-productivity is due to (i) a large percentage of pistils remaining non-functional, (ii) degeneration in the egg apparatus at the time of bloom, and (iii) anthracnose disease.

Selection of a variety which has a long flowering period will ensure better pollination of perfect flowers.

#### (b) *Cultivation*

The object of cultivation should be to maintain the trees in proper vigour and to discourage vegetative growth late in the season. In Bihar three annual ploughings are recommended—one in spring and two in autumn. No irrigation should be applied after November. Judicious manuring should be done before flowering or about a month before the monsoons start. Nitrogenous fertilizers should be applied generously in the 'on' year. Even all these necessary measures would not ensure regular bearing every year, but these would help averting completely 'off' years. Sen (1946) has suggested that if the tree does not produce good vegetative flush early in summer, 5 to 10 lbs. of ammonium sulphate per tree depending on its age should be applied in June and followed by heavy irrigation.

#### (c) *Deblossoming*

Experiments carried out in Bihar and the Punjab have shown that a deblossomed shoot can produce blossoms again in the following year. In Bihar it was found that when 50% of the blossoms were removed in the 'on' year there was no decrease in yield that year and there was definite beneficial effect in the following year.

#### (d) *Other treatments*

Kinman (1918) tried girdling in Puerto Rico. In India too, girdling of all branches six to nine inches thick, during the month of August in the case of overly vegetative trees, is considered desirable for inducing

## THE MANGO

flowering. However, as a regular practice it is considered devitalising and is not recommended.

In Ratnagiri in Bombay State, salt is often applied to mango trees. Common salt at the rate of five to ten pounds per tree is applied to the roots at the time of light rains in September, in a circular furrow one foot wide and one foot deep under the drip of the tree. It stops further vegetative growth. The value of this practice in controlling irregular bearing is doubtful, but it is useful in inducing flowering in overly vegetative young trees.

Wester (1920) found in the Philippines that the mango can be made to blossom almost at any time of the year by smudging. He smoked the trees both during the day and night for one week. Thereafter light fires were made around them in the mornings and evenings for about a month, till flowers appeared. Alcala and San Pedro (1935) and Lanuza (1939) also found this method successful. Sen tried smudging in Bihar but the trees did not respond.



## CHAPTER TWO

### INSECT PESTS AND DISEASES

THE mango crop suffers losses on account of several insect pests and diseases, all over the world. In India, the jassid hopper or mango hopper, mango weevil, and powdery mildew are serious menaces. If not properly controlled, the hoppers can destroy the whole crop, but usually the losses vary from 25 to 60%.

#### INSECT PESTS

##### **Mango Hopper** (*Idiocerus* spp.)

The leaf-hopper which thrives on mango inflorescence, first attracted the attention of workers in India as far back as 1889. Lethierry (1889), quoted by Palo and Garcia (1935), identified three species, namely *Idiocerus atkinsoni*, *I. niveosparsus*, and *I. clypealis*. These pests are found all over India. One or more species may be met with in each State. In Bihar and South India, all the three species have been reported, and in the Punjab only *I. atkinsoni* and *I. clypealis*.

Of the three species, *I. clypealis* is the smallest and the most troublesome in India. According to Uppal and Wagle (1944), the adults of *I. atkinsoni* are found mainly on the main trunk and branches of mango trees, whereas *I. niveosparsus* and *I. clypealis* are found on the leaves, except in the flowering season when they mostly feed on the flower shoots. *I. clypealis* is the most prolific breeder, and usually breeds on flowers once a year, often in the months of January and February. On the other hand, *I. niveosparsus* breeds not only in the flowering season, but also in June and October. *I. atkinsoni* is a shy breeder and breeds three times in the year mostly on vegetative shoots, and rarely on blossoms. All the three species pass the remaining period of the year in the adult stage on the stems and leaves of mango. No alternate hosts are known (Wagle, 1934), although sometimes they are also seen on the leaves of various species of Citrus and *Calophyllum inophyllum*, but these do not serve as alternate food plants for the insect (Uppal and Wagle, 1944).

In the Konkan and Karnatak, *I. clypealis* predominates which is very pernicious on account of its prolific breeding during the flowering season.



## THE MANGO

The other two species are usually found in large numbers in South Gujarat and the suburban areas of Bombay. In South India all the three species are present, but *I. nigrosparsus* is the most destructive. In Mysore, *I. clypealis* is found mainly on flower spikes, whilst the other two breed on young vegetative shoots as well. In the Punjab, *I. atkinsoni* and *I. clypealis* are the only two species found, the former being more prevalent.

### Jassid Hopper

This hopper is a small insect, 1/6th to 1/8th of an inch. The adults are wedge-shaped, and belong to the class of bugs. By means of sucking type probes (rostrum) they puncture the tissues of the tender plants and deprive flowers, fruits and tender shoots of their sap. During the hot months, the insects are found clustering on the lower side of the thicker limbs of the trees and among the leaves, whereas in winter they hide in the crevices of the bark or under the leaves. They shun sunlight and prefer shady places. Cloudy weather encourages the incidence of attack. According to Palo and Garcia (1935), dark nights and calm weather with mean humidity of nearly 90% seem to encourage large-scale flocking of these. The nymphal and adult stages are the only ones at which they are destructive, because it is at these stages that the insects feed on plant sap and excrete a sticky substance, on which a black sooty mould develops covering the entire foliage, and interfering with the normal functioning of the plant. According to Uppal and Wagle (1944) the damage done by the adult hopper is comparatively small, because it feeds mainly on the vegetative shoots and young leaves and seldom on the flowers.

### Life history

The eggs are deposited in the tissue of the floral shoots or in the unopened flowers. The nymphs emerge in adult 4 to 6 days in Bombay, and 8 to 10 days in the Punjab. Hayes (1953) says that they grow rapidly, and moult five times before they become winged adults in about 10 to 13 days in Bombay and 17 to 19 days in the Punjab. The total length of life cycle varies from 25 to 29 days in the Punjab. Life history of these hoppers is approximately identical for all the species.

### Control

In the past, the control measures consisted in one or more applica-

tions at the time of flowering, of sulphur dust, tobacco decoction, crude oil emulsion during the nymphal stage, fish oil rosin soap— up to five sprays, and pyrethrum. Treatment in the non-breeding season did not prove successful. Wagle (1934) considered three dustings of finely powdered sulphur, each at a fortnight's interval at the time of flowering, most efficient and economical. In Gujerat 8 to 10 dustings were found necessary (Uppal and Wagle, 1944). Deshpande and Karandikar (1948) found that fish oil rosin soap (1 lb. diluted with 4 gallons of water) controlled the pest in the nymphal stage but had little effect on the adults.

In the post-war period, considerable progress has been made in the control of this pest. Trehan (1947-48) has reported that dusting with 10% D.D.T. and sulphur mixed in the ratio of 1:1 is an effective control measure, though, spraying with 0.2% D.D.T. had also proved quite economical and effective. Sohi and Batra (1950) secured good results with a single spray of 0.15% D.D.T. in the month of March. This spray is effective for at least five weeks. Success with Guesarol 550 (50% D.D.T. in wettable powder) is reported by Latif and Qayyum (1950) in the Punjab and Roy and Ram (1952) in Bihar. The former workers recommend a dilution of 1:300, and the latter suggest that spraying should be started at the time of flower-bud differentiation in a dilution of 1 in 40, to be repeated three times at weekly intervals. Gandhi (1955) recommends dusting with a mixture of D.D.T. and sulphur dust (325 mesh) to control the mango hopper and the powdery mildew. Guesarol 405-50 is a good ready-made product of these two ingredients, containing 5% D.D.T. and 50% sulphur. The dusting is recommended three times at intervals of a fortnight each, commencing with the emergence of flowers. The addition of sulphur is necessary since D.D.T. alone will kill the hoppers but will, at the same time, encourage multiplication of mites—another minute insect pest not killed by D.D.T. The hoppers prey on mites and keep them under check. Sulphur alone can repel the hoppers, control the mildew, and kill the mites.

Dusting should not be done on a very windy day, since it proves ineffectual. A 25 feet tall tree requires about two pounds of the dusting mixture. If rain washes off the insecticide, dusting should be repeated after three or four days. The duster should be operated with the back to the wind, as the powder causes irritation to the eyes.

De and Dutta (1955) from West Bengal report that *I. atkinsoni* Leth. can be effectively controlled by systemic insecticide Pestox III of 4% con-



centration. It can be used during occasional rains also because water does not wipe off the entire effect of the insecticide.

### **Mango Borer**

The insect is found widely distributed on old mango trees in various parts of the country. Two species, namely *Batocera rubus* and *Chlumetia transversa* Wlk., have so far been recorded. The collection of *Chlumetia transversa* in British museum showed that it is also present in Ceylon, Malay Peninsula and some islands in the East Indies (Hampson, 1912). It destroys mangoes and figs.

#### *Batocera rubus*

This is a common and serious pest of mango trees. It is a stout beetle grub which bores into the stem or branch of the tree. Cracks in the bark and the presence of sawdust-like powder near the tree are indications of attack by the insect. Eggs are usually laid in the chinks of the older barks, and the grubs on hatching bore into the stem. Zigzag or spiral tunnels are made in the bark. Branches badly infested with this borer are girdled completely and wither away. Sometimes huge trees are seen dying due to this pest.

The remedy lies in removing the grubs by a hooked wire from inside the cracks. Where this cannot be done successfully, the holes should be plugged with cotton, dipped in carbon bisulphide, petrol or chloroform, or tipped with a crystal of potassium cyanide. These should finally be closed with mud. Rahman (1946) recommends killing of the larvae by injecting a little quantity of kerosene oil by means of a syringe or introducing 1-2 grains of potassium cyanide into the tunnel. The holes are closed in either case with mud. Naik (1949) states that a paste made of crude carbolic acid (1 pint), soft soap (2 lbs.) and hot water (1 gallon) is effective for plugging the holes and gives good results. Injuries inflicted on the tree as a result of these operations are cured by painting it with coal tar. All the trees should be treated alike. The dead branches of the tree should be removed and burnt. Rahman (1946) also recommends a wrap of wire gauge (1/6 in. mesh) to be tied loosely around the stem during the egg laying stage of the insect.

#### *Chlumetia transversa* Wlk.

It feeds inside the young growing shoots especially during the rainy season. The hollowed shoots drop off and dry at the end.

The damage can be considerably reduced by cutting the twigs below the tunnel and burning them. Spraying with 0.5 per cent lead arsenate at 3 to 4 days' intervals checks the attack on the new shoots, (Cheema *et al*, 1954).

### Mango Stone Weevil

This is a common pest found in most parts of the world where the mango is grown. It belongs to two species of *Cryptorhynchus* (*Sternonchetus*): *C. gravis* reported in eastern Bengal and Assam and also in Java, and *C. mangiferae* found in South India (Hayes, 1953). Gandhi (1955) states that the *Bangalora* variety of mango from Madras is generally susceptible to this pest.

The eggs are laid in the fleshy portion of the young fruit, and the grubs find their way into the seeds passing the remainder of their lives there changing into pupae and finally into weevil. When the fruit ripens, the weevil comes out of the stone and eats into the pulp. The presence of more than one grub in a young seed may result in its entire destruction, but usually the damage is not so serious as to prevent germination.

Since the pest spends the whole of its early life inside the seed, there is no external sign of injury to the fruit. Pulp adjacent to the stone is seen discoloured due to the excretions of the worm, when the fruit is cut. There is no method to effect complete control of the pest. The affected fruits and stones should be burnt, and the soil around the affected trees dug up to expose the weevils.

### Fruit Fly

Four different species of this pest, namely, *Dacus ferrugineus*, *D. zonatus*, *D. correctus*, and *D. ferrugineus dorsalis* are met with. According to Rahman (1946) the peach fruit-fly is most destructive to mangoes and guavas, and also attacks peaches in the Punjab.

The fruit fly lays eggs in the fully matured fruit and the white wriggling maggots spoil the entire pulp. When fully grown, they come out of the fruit and pupate in the soil. It is a serious pest in some seasons. In South India, it appears to infest the late varieties, particularly.

The most effective control measure consists in destroying the fruits attacked by maggots. The fallen fruits may be used as traps for the flies to lay more eggs which can be destroyed easily. As there are five or six broods in a season, the destruction of the first brood is most important.



## THE MANGO

Poisoned baits can be used to attract and kill the flies before they lay their eggs. Rahman (1946) recommends a poisonous bait spray consisting of 1 *chattack* lead arsenate, 2 *chattacks* molasses, and 4 seers of water. The spray may be applied on a small patch of the foliage of a tree during June-August at intervals of once a week or sometimes even oftener. Parsons (1931) from Ceylon recommends a bait for the fruit fly of *Dacus* species, consisting of a mixture of 6 lbs. of cheap sugar and 6 oz. of arsenate lead dissolved in 8 gallons of water. The mixture can be sprinkled on the leaves or exposed in tins or bottles suspended from the branches with strips of cloth or lamp-wick put in them with one end projecting out. Naik (1949) from South India states that spraying of crude oil emulsion in a strength of 1 lb. in 10 gallons of water prevents flies from laying eggs. Gammexane dusting has also been suggested by some. Since the maggots pupate in the soil, raking of the soil round about the trees will be a great help in destroying the pupæ.

### Mango Mealy Bug

The pest is found all over the country, though Rahman (1946) states that it causes particularly heavy damage in certain districts of the Punjab.

The bug, *Drosicha* (*Monophlebus*) *stebbingi* feeds on as many as 62 different plant species. According to Rahman and Latif (1944), mango, citrus fruits, jujube and guava suffer most from it. The insects attack the terminal fruiting branches and the young shoots wither without the fruit ever forming.

Only the adult females are destructive. They are found in thick clusters on the terminal shoots and branches of mangoes and some other plants during February-April. They crawl down in the month of May and enter the soil, where they lay eggs. The adult female at this stage is about half an inch in length and is covered with white wax. The winged male adults are also seen at this time. The eggs laid in May remain unhatched till the following January-February, when they hatch and the young ones crawl up the trees again.

Control lies in banding the trees with greased bands. Rahman (1946) recommends that the bands should be put in December and kept up to the end of April. A band is made of fluffy cotton wool or sunnhemp rope or thick *munj* rope soaked in a mixture of coal-tar and crude oil emulsion in equal parts, or in 3 seers of rosin dissolved in one seer of rape seed oil. The band about 9 inches wide is put around the tree trunk about 3 to 4

feet high from the ground. The nymphs marching up are thus collected and killed either by fish oil rosin soap spray (strength: 12 *chattacks* of fish oil rosin soap dissolved in 4 gallons of water) or by simply putting them in a vessel containing water with a film of kerosene oil on the surface. As a result of banding of mango trees in Uttar Pradesh yields have been doubled. Rahman and Latif (1944) recommend a material called 'namhar' for banding the trees.

### Scale Insects

There are several types of these insects which attack mango leaves and fruits. Burns and Prayag (1920) have listed five of these, of which *Aspidiotus destructor* is the most serious. The insect settles on the tender parts of the tree. Ansari (1947) says that it is generally kept under check by its natural enemies, and that spraying with 4:4:50 Bordeaux mixture to which 2 to 3 pounds of fuel oil have been added, or the rosin wash are also effective in eliminating it. It can also be destroyed with fish oil rosin soap spray (one part of the soap in 40 parts of water). Parsons (1931) from Ceylon recommends a spray of 2 per cent solution of lime and sulphur. This being a combination of insecticide and fungicide also acts as a deterrent for many leaf-eating insects. Berger (1935) claims success with an oil-emulsion spray, containing 1% white oil.

The other species of scale insects recorded in India are *Coccus* sp. (Lecanium), perhaps *C. hesperidum*; *Leucaspis indica*; *Chionaspis dilatata*; *Pulvinaria psidii* and *Icerya seychellarum*; *Chionaspis vitis*, *Pulvinaria polygonata*, *P. pergandei* and *Lepidosaphes gloverii*. The only remedy suggested for these insects is a rosin wash.

Ahmad (1945) found the bug (*Spilostethus pandurus*) a serious mango pest in Agra area. It sucks juice from the fruit, making it fall. Very little is known about its history, or of control measures that are effective against it.

### White Ants or Termites

These cause extensive damage to fruit trees including the mango, though they seldom attack the healthy and vigorous trees. Lal (1950) reports that injury from them to trees up to three years old is common.

Rahman (1946) suggests a number of control measures, such as clean cultivation, frequent irrigations, interculture and hoeings and avoiding use of partially decomposed manure or farmyard manure in areas where



## THE MANGO

the white ant attack is severe. Before planting the trees, pits should be treated with a special crude oil emulsion mixture ( $\frac{1}{2}$  lb. of crude oil emulsion mixed with 4 basket-measure of sub-soil and a little arsenic).

A strong solution of sanitary fluid (3 parts of the fluid in 100 parts of water) should be poured into the irrigation ring in order to protect the roots from white ants. The tree trunks are also painted with sanitary fluid at the rate of six ounces of fluid per tree up to 7 inches above the soil.

## DISEASES

### Powdery Mildew

Losses due to mildew may range at times from 5 to 20% of the total crop mostly during the months of February and March (Cheema *et al.* 1954).

The disease is reported to be prevalent in Uttar Pradesh, Bombay, and South India. It is caused by a fungus called *Oidium mangiferae*. It can be distinguished easily by the whitish coating that forms on the affected blossoms. It generally makes its first appearance on the scales, fruits, flower buds, and leaf stalks of the plants. Minute spores of the fungus from the flower heads are swept by winds to the neighbouring unopened flowers, which become diseased, developing in their turn, spores within five days. According to Raisinghani (1945), the disease becomes more widespread if there are rains during the flowering season, but the loss can be reduced by 50 to 75% if the branches are shaken after each shower. The fungus feeds on the outer cells of flowers and very young fruits, which finally dry up and drop down.

The disease is controlled best by dusting the plants with fine sulphur powder (250 to 300 mesh). Coarse sulphur has little fungicidal value. Dusting with sulphur is effective against both hoppers and powdery mildew. Cheema *et al.* (1954), recommend 1-3 lbs. of sulphur dusting per tree in the coastal areas. The first application is to be made soon after flowering and the second 15 days later, followed by a third one. If the dustings are followed by rains, these may be repeated. Dusting is done preferably in the mornings when the weather is calm. Naik (1949) from South India reports that spraying with Bordeaux mixture (3 lbs. quick lime, 3 lbs. copper sulphate and 50 gallons water) just before flowering has given good results. Gandhi (1955) recommends Guesarol 405-50 consisting of 5 per cent D.D.T. and 50 per cent sulphur as an effective remedy.

for both hoppers and powdery mildew. Normally, about 2 lbs. of the mixture are required to dust a tree about 25 feet high. Larger trees require about 3 lbs.

### Anthracnose

This is a fungoid disease prevailing mostly in moist climates, and is found in Tamilnad, Travancore-Cochin and Assam (Gandhi 1955). It has also been reported in the Punjab by Sattar and Malik (1939). It is caused by the fungus *Colletotrichum glæosporioides*. Hayes (1953) reports that in Uttar Pradesh, a related fungus known as *C. mangifera*, which attacks only twigs and branches, is said to be the cause of mango die back. According to him in Bombay, a similar disease called blight, is caused by *Glæosporium mangifera* which attacks flowers also. Sattar and Malik (1939) consider *C. glæosporioides* and *G. mangiferæ* to be identical.

Anthracnose generally attacks tender mango trees, affecting the flowers and fruits alike. On the twigs the disease appears in the shape of small black spots. Dark brown spots develop on the leaves also. The spread of the disease is rapid, causing the flowers and flower stalks to wither—thus preventing the trees from bearing. In the case of a light attack on the flower clusters, some fruit may set in, but is eventually destroyed when the disease progresses. Fruits of all ages may be infected, and young fruits may be shed. Black spots develop on older fruits, and increase in size with advance in maturity. Fruits may also rot in storage as a result of attack by this fungus; but luckily only a few varieties are found susceptible to it.

The control of the disease consists in removing all dead and affected twigs and leaves and burning them. Sattar (1946) recommends spraying the young plants in the nursery with a fungicide such as Bordeaux mixture (copper sulphate 3 lbs., quick lime 3 lbs. and water 50 gallons) three times a year in February, April, and September. Experiments with such spraying on mature trees have yet to be conducted and hence no definite recommendation can be made at this stage. Sattar suggests that control measures should be taken up in relation to the mango and the citrus fruits simultaneously as the same fungus attacks these plants. Gandhi (1955) recommends the same. Cheema *et al.* (1954), opine that the disease can be controlled by the application of Bordeaux mixture (3: 3: 50) with calcium caseinate included as a spreader. In all they recommend eight



applications, three at flowering stage and five when the fruit sets. Nair (1949) recommends the same: one application of the mixture before the flowers open, and two or three, later, at intervals of a week or ten days. To control the rot in storage it is advisable to store the fruit in ventilated rooms, taking care that the skin is undamaged. Baker (1938) and McKee (1940) claim that 1% Burgundy mixture, freshly prepared, if sprayed regularly throughout the season, gives effective protection. Conover and Ruehle (1949) from Florida have reported that Bioquin—1 (copper-8-quinolinolate) is as effective as Bordeaux and leaves no visible marks on the fruits. Parsons (1931) from Ceylon recommends spraying with Bordeaux mixture or 'Sulfinette', 1-2 per cent solution in water, about once a week after the fruits have set until they ripen.

### **Bunchy Top**

The disease, commonly known as the 'malformation of mango inflorescence', has recently attracted much notice. It has been reported from the Punjab, Uttar Pradesh and Bombay. Sattar (1946) has pointed out that its incidence is on the increase in the Punjab, and that it varies greatly from variety to variety, and even from tree to tree within the same variety. Cheema *et al.* (1954), report that the disease is more prevalent in Gujerat than in other parts of Bombay State. Tripathi (1954) who has been investigating into the 'Bunchy top' and 'Malformation' of the mango at Saharanpur, concludes that both these may be regarded as symptoms of the same disease, which may be termed as 'Mango Malformation'. Nirvan (1953) from Saharanpur in Uttar Pradesh reports 'Bunchy top' on the young mango seedling plants in the nursery stage during November-December, when these are four to five months old. The disease is marked by swellings in the axil of the leaf and production of several small shoots at the apical end of the plant. The panicle is very much reduced and thickened. The floral bunches are crowded in the form of a cone and open very late, if at all. Later on, the whole mass turns black. The affected panicles seldom bear fruit. Sometimes the inflorescence persists and becomes vegetative. The trouble may be confined to a few branches of the tree, or the whole tree may be affected. Sattar (1946) has found no insect or fungal organism associated with this abnormality. It is thought that it may be caused by a virus or may be due to some physiological disorder. Normal fruit is sometimes borne on the malformed branches. Tripathi (1955) from Saharanpur, experimenting on that disease in relation to deficiency of mineral nutrients

found that malformation is not caused by lack of micro or macro nutrients.

No definite control measures have been suggested so far. It is, however, recommended that all the malformed inflorescences should be removed from the tree and burnt. This operation is likely to check the infection.

### **Black Tip**

The malady generally occurs in orchards located close to operating kilns, and is caused by the smoke issuing from the modern coal burning brick kilns (Bulls' kiln). It is particularly marked in the mango growing tracts of Bengal, Bihar, Uttar Pradesh and the Punjab, but is practically unknown in Madras, Mysore and Bombay. It has been reported by Sen (1943) that brick kilns are not in vogue in the latter regions.

Of the coalfume gases, sulphur dioxide, ethylene and carbon monoxide are specially toxic to plants: and of these sulphur dioxide is the worst offender. Gupta *et al.* (1950), by burning coal in orchards have produced the disease on a small number of fruits. However, they could not establish with definiteness that necrosis was due to the effects of sulphur dioxide, carbon monoxide or ethylene. They could cause the disease by introducing into young mangoes the sterile juice of necrotic mangoes. Ranjan and Jha (1940) earlier found that ethylene at a strong concentration of 1:100 produced characteristic symptoms, while in greater dilutions it caused more rapid respiration, increased sugar content, and softening. Sulphur dioxide with or without ethylene, had a similar effect, and caused the general condition of the fruit to deteriorate. Similar observations have been reported by Sen (1943), who found this disease when the young growing fruits were exposed to coal smoke during the active development period. It did not occur when the mature fruits were exposed to smoke although adverse effects like premature ripening and the skin turning yellow were noticed. The disease always sets in the apex (tip) of the fruit, and the apical portion is the first to turn yellow which gradually deepens into dark brown, finally becoming black. The condition closely resembles that caused by dry rot. Das Gupta and his colleagues (1939, 40 & 41) confirm that the disease is not associated with any virus or soil condition. Sen (1934) made a detailed survey of the orchards in Bihar and Uttar Pradesh, and found that the damage was more severe in orchards situated on the easterly and westerly sides of operating kilns. Different mango varieties showed varying degrees of the damage, though all were affected when

## THE MANGO

growing within a distance of 500 feet to 600 feet of kiln. The maximum distance up to which damage has been traced is 700 yards.

The only remedy lies in using telescopic chimneys, about 50 feet high, or in closing down the operating kilns near the orchards from the first of March for the entire mango season.

## APPENDICES





## APPENDIX I

### COMMERCIAL TABLE VARIETIES OF MANGO

- |  |                         |
|--|-------------------------|
| 1. All the Year Round ( <i>Baramasia</i> ) | 19. Langra              |
| 2. Alphonso Bihar                          | 20. Malda Handle        |
| 3. Alphonso Bombay                         | 21. Mankurad            |
| 4. Anopan                                  | 22. Mundappa            |
| 5. Bangalora                               | 23. Neelum              |
| 6. Banganpalli                             | 24. Pairi               |
| 7. Bombai                                  | 25. Rajapuri            |
| 8. Bombay Green                            | 26. Rumani              |
| 9. Bombay Yellow                           | 27. Safeda Lucknow      |
| 10. Cherukrasam                            | 28. Safeda Malihabad    |
| 11. Dusehri Aman                           | 29. Salem Bangalora     |
| 12. Dophool                                | 30. Samarbehisht Chowsa |
| 13. Fajri                                  | 31. Sardar              |
| 14. Fazli Malda                            | 32. Schroli             |
| 15. Fazli Zumko                            | 33. Shah Pasand         |
| 16. Fernandin                              | 34. Sukul               |
| 17. Jamadar                                | 35. Suvarnarekha        |
| 18. Kalipari                               |                         |

### COMMERCIAL JUICY VARIETIES OF MANGO

- |                       |                 |
|-----------------------|-----------------|
| 1. Chandrakaran       | 6. Panakalu     |
| 2. Chinnarasam        | 7. Pedda Rasam  |
| 3. Kandel             | 8. Raspunia     |
| 4. Kothapalli Kobbari | 9. Sakkar Gutli |
| 5. Panchadarakalasa   |                 |

### DESSERT VARIETIES OF MANGO

- |                             |                           |
|-----------------------------|---------------------------|
| 1. Allumpur Baneshan        | 11. Amin Tehsil           |
| 2. Alphonso Batli           | 12. Amlet                 |
| 3. Alphonso Punjab          | 13. Anar Mulgoa           |
| 4. Aman Abbasi              | 14. Anokha Sarda          |
| 5. Amin Abdul Ahed Khan     | 15. Ashraf-us-Samar       |
| 6. Amin Heera               | 16. Asojia (Late variety) |
| 7. Amin Ibrahimipur         | 17. Athimadhuram          |
| 8. Amin Khurd               | 18. Aziz Pasand           |
| 9. Amin Mohammad Yunus Khan | 19. Azm-us-Samar          |
| 10. Amin Sahai              | 20. Bagal Sahai           |

## THE MANGO

- |                                     |                          |
|-------------------------------------|--------------------------|
| 21. Benazir Sandilla                | 51. Khas-ul-Khas         |
| 22. Bhadrul Asmar                   | 52. Khudadad             |
| 23. Bhaduriya (Late variety)        | 53. Khuddus              |
| 24. Bharat Bhog                     | 54. Kishen Bhog          |
| 25. Bombai Abdul Huq                | 55. Lal Mulgoa           |
| 26. Borsha Kalamsar                 | 56. Langra Large         |
| 27. Brindabani                      | 57. Markeara             |
| 28. Buddu Ka Kelwa                  | 58. Mulgoa               |
| 29. Chota Jhangir                   | 59. Murshidabad          |
| 30. Dadamiyo                        | 60. Nazeem Pasand        |
| 31. Dondakayalumanu                 | 61. Nisar Pasand         |
| 32. Doodia                          | 62. Padiri               |
| 33. Fakr-us-Samar                   | 63. Panja Pasand         |
| 34. Fajri Zafrani                   | 64. Rataul               |
| 35. Gopal Bhog                      | 65. Rehmat Khas          |
| 36. Gulab Jaman                     | 66. Safdar Pasand        |
| 37. Gulab Khas                      | 67. Safeda Calcutta      |
| 38. Himayuddin                      | 68. Safed Mulgoa         |
| 39. Himsagar                        | 69. Sakkar China         |
| 40. Hushnara                        | 70. Salebhoy Amidi       |
| 41. Imam Pasand                     | 71. Samarbehisht Alibagh |
| 42. Inayat Pasand                   | 72. Samarbehisht Rampur  |
| 43. Jailor                          | 73. Shadwala             |
| 44. Janardhan Pasand (Late variety) | 74. Shamsul-Asmar        |
| 45. Jhangir                         | 75. Taimuria             |
| 46. Kachmuha                        | 76. Van Raj              |
| 47. Kalapahar                       | 77. Willard              |
| 48. Kancha Mitha                    | 78. Zafran               |
| 49. Karutha Kolamban                | 79. Zardalu              |
| 50. Khasa Ibrahimpur                |                          |

## APPENDIX II

## QUANTITATIVE CHARACTERS

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS					INFLORESCENCE				STONE DIMENSION			
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.				
1	2	3	4	5	6	7	8	9	10	11	12				
1.	Abe-Hayat	38	197	8.3	6.5	5.6	36.0	25.5	6.0	3.3	1.8				
2.	Alibag Samarbehisht	393			<i>vide</i>	Samarbehisht	Alibag								
3.	Alipasand	41	336	12.1	8.3	7.8	28.4	20.2	8.3	3.0	2.1				
4.	All the Year Round	109	213	11.1	7.0	6.8	22.0	14.0	7.7	2.8	2.0				
5.	Allumpur Baneshan	42	566	13.8	9.2	8.7	25.2	24.5	8.8	3.8	2.4				
6.	Alphonso Batli	45	241	11.5	6.0	5.5	25.2	24.2	9.5	2.8	2.0				
7.	Alphonso Bihar	46	241	8.8	6.8	6.3	20.2	15.1	7.2	3.3	2.2				
8.	Alphonso Black	49			<i>vide</i>	Black	Alphonso								
9.	Alphonso Bombay	50	241	11.3	8.5	7.9	24.8	32.5	7.8	3.8	2.0				
10.	Alphonso Punjab	53	227	9.5	8.0	7.4	23.0	18.0	7.2	3.3	2.0				
11.	Alphonso White	54	199	11.9	9.0	8.4	24.2	23.9	7.9	4.3	2.9				
12.	Aman Abbasi	57	340	12.5	7.0	6.5	22.0	20.0	9.5	3.2	1.9				
13.	Aman Angoori	58	227	11.7	6.1	5.6	22.0	14.0	10.7	3.5	1.8				
14.	Aman Dusehri	162			<i>vide</i>	Dusehri	Aman								
15.	Aman Ford	285			<i>vide</i>	Machli									
16.	Ambalavi	61	201	12.3	6.4	5.5	40.0	45.0	10.3	3.8	1.8				
17.	Amin Abdul Ahed Khan	62	340	12.3	8.0	7.5	21.3	12.5	9.3	3.8	2.2				
18.	Amin Heera	65	411	13.2	7.6	7.0	26.3	15.0	11.0	3.8	1.9				
19.	Amin Ibrahimpur	69	425	12.8	7.9	7.4	24.0	18.0	9.9	3.3	2.0				
20.	Amin Khurd	70	298	12.5	8.0	7.5	25.0	13.8	9.0	3.6	1.7				
21.	Amin Mohd. Yunus Khan	73	275	9.8	7.2	6.5	20.0	18.0	7.8	3.3	1.8				
22.	Amin Sahai	74	326	13.2	6.6	6.0	22.5	15.0	11.0	3.5	1.9				
23.	Amin Tehsil	77	285	13.5	8.5	8.0	21.3	12.5	9.5	4.0	2.2				
24.	Amini	66	552	14.8	11.1	10.4	32.4	23.3	8.4	3.8	2.0				
25.	Amlet	78	573	16.1	11.7	9.6	25.2	18.5	10.7	4.0	1.5				



## QUANTITATIVE CHARACTERS—Continued

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS			INFLORESCENCE			STONE DIMENSIONS		
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.
1	2	3	4	5	6	7	8	9	10	11	12
26	Ananas Fatchpuri	294			<i>vide</i> Markeara						
27	Anar Mulgoa	81	564	17.6	10.0	9.2	24.8	24.4	14.5	4.5	2.0
28	Anokha Sarda	82	675	17.0	10.5	9.7	34.0	14.0	13.3	5.0	2.0
29	Anopan	85	240	9.0	7.8	6.0	21.3	12.5	3.1	3.5	2.0
30	Anora	86	652	18.0	9.3	7.8	28.0	15.0	13.2	4.8	2.6
31	Anwar Rataul	362	170	8.5	6.3	6.0	21.3	16.3	6.5	3.5	2.2
32	Appas	50			<i>vide</i> Alphonso Bombay						
33	Ashraf-us-Samar	89	170	8.5	7.5	7.0	25.0	17.0	7.2	3.7	2.2
34	Asojia	90	230	9.6	6.2	5.4	18.8	12.5	6.6	3.1	1.5
35	Athimadhuram	93	308	9.2	8.4	8.4	20.6	19.8	7.6	4.0	2.2
36	Aziz Pasand	94	199	10.5	7.5	7.0	23.8	12.5	8.0	3.6	1.7
37	Azum-us-Samar	97	425	13.7	9.0	8.4	29.0	19.0	9.8	4.5	2.0
38	Badami	50			<i>vide</i> Alphonso Bombay						
39	Badsha Pasand	377			<i>vide</i> Safeda Lucknow						
40	Bagal Sahai	98	227	13.3	7.6	7.2	23.8	13.8	11.0	3.7	1.5
41	Bhaduriya	118	128	10.0	7.2	6.8	31.0	19.0	6.9	3.2	2.1
42	Baneshan	102			<i>vide</i> Banganpalli						
43	Bangalora	101	482	15.0	8.0	7.1	23.4	23.6	12.6	4.0	1.9
44	Banganpalli	102	626	14.3	11.0	9.1	21.6	20.8	10.0	4.4	2.5
45	Banglawala	413			<i>vide</i> Shamsul-Asmar						
46	Banka	105	284	14.4	7.0	6.6	24.0	12.2	12.3	3.5	1.5
47	Bansod	106	562	15.0	9.7	9.3	24.3	23.9	12.0	4.5	2.5
48	Baramasia	109			<i>vide</i> All the Year Round						
49	Batli	45			<i>vide</i> Alphonso Batli						
50	Begum Pasand	110	189	9.3	6.3	5.9	32.5	20.0	7.8	3.3	2.3
51	Belkhas	113	170	8.8	5.3	4.7	22.8	21.5	7.6	3.2	1.7
52	Betnazar Saudilla	114	284	12.7	8.7	8.3	30.0	12.0	9.2	4.1	1.2
53	Badrul Asmar	117	204	10.1	6.0	5.6	20.0	15.0	8.6	3.2	2.0

## APPENDICES

## QUANTITATIVE CHARACTERS—Continued

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS			INFLORESCENCE			STONE DIMENSIONS		
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.
1	2	3	4	5	6	7	8	9	10	11	12
54.	Bhawani Chowras	121	198.5	9.0	6.2	5.7	21.0	19.0	7.3	3.3	2.1
55.	Bharat Bhog	122	297	11.7	7.6	7.1	18.0	19.0	8.2	3.7	2.2
56.	Bhopli	125	567	11.2	10.5	10.1	25.2	32.4	8.5	5.1	2.7
57.	Bihar Alphonso	46									
58.	Bili Ishada	54									
59.	Black Alphonso	49	269	11.3	8.7	8.3	25.4	24.9	8.0	4.2	2.1
60.	Black Andrews	126	538	11.2	8.9	8.6	27.8	20.4	7.9	4.6	2.3
61.	Bobbili Pedda Kavalu										
	Punasa	253									
62.	Bombai	129	227	8.1	6.3	5.8	21.8	15.1	5.6	2.5	2.0
63.	Bombai Abdul Huq	130	120	9.8	6.8	5.9	20.0	15.0	7.5	3.0	1.8
64.	Bombay Bhutto	133	241	10.8	7.9	7.5	23.6	16.8	8.2	4.4	2.2
65.	Bombay Darsha	134	269	12.1	7.9	7.4	24.6	24.2	8.8	3.8	2.4
66.	Bombay Green	137	227	11.0	8.0	7.5	22.5	12.5	8.6	3.8	2.4
67.	Bombay Yellow	138	241	10.2	7.0	6.3	20.0	19.3	8.0	3.6	1.9
68.	Borhsa Kalamsar	141	142	9.0	6.9	6.4	20.8	20.4	5.5	2.7	1.8
69.	Bride of Russia	430									
70.	Brindabani	142	230	11.3	7.5	7.1	33.8	15.0	9.7	3.9	2.3
71.	Buddipasad	145	454	10.2	9.4	9.2	24.2	23.8	5.3	3.5	2.0
72.	Buddu Ka Kelwa	146	199	11.2	5.5	5.1	26.0	14.0	9.3	3.0	2.0
73.	Burmodilla	101									
74.	Calcutta Safeda	374									
75.	Chambatan	149	185	9.7	6.1	5.8	48.0	58.0	7.1	2.6	1.7
76.	Chandrakaran	150	42	6.1	3.9	3.4	25.6	24.8	5.4	3.1	2.0
77.	Chapta	102									
78.	Chaptai	102									
79.	Cherukarasam	153	329	12.0	7.5	7.1	33.4	24.8	9.4	3.5	2.1
80.	Chinnarasam	154	427	12.2	8.9	7.9	31.4	23.8	8.9	4.9	2.9

## QUANTITATIVE CHARACTERS—Continued

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS			INFLORESCENCE			STONE DIMENSIONS		
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.
1	2	3	4	5	6	7	8	9	10	11	12
81.	Chunna Suvannarekha	434			<i>vide</i> Suvannarekha						
82.	Chota Jehangir	157	510	10.7	10.7	10.2	28.6	27.7	9.3	4.7	2.8
83.	Collector	101			<i>vide</i> Bangalora						
84.	Colour	346			<i>vide</i> Pulihora						
85.	Cowasji Patel	158	751	14.7	11.1	10.6	24.6	24.1	9.3	3.8	2.3
86.	Dadamivo	161	360	12.5	9.2	7.1	29.0	28.0	9.2	3.8	2.0
87.	Daudiwadi Amin	62			<i>vide</i> Amin Abdul Abed Khan						
88.	Dilpasand	165	230	11.2	6.5	5.9	30.0	21.0	9.8	3.0	2.0
89.	Dondia Kavalumanni	166	406	13.1	8.8	7.6	21.8	21.5	8.9	3.9	1.8
90.	Doodia	169	205	10.5	5.8	5.2	28.4	27.6	9.0	3.3	2.1
91.	Doodia Mulgoa	169			<i>vide</i> Doodia						
92.	Dophool	170	624	11.5	10.0	9.6	26.0	28.0	8.0	4.5	2.7
93.	Dusehri Aman	162	172	8.3	6.3	6.0	30.0	35.3	5.8	3.8	1.8
94.	Fajri	173	567	13.8	10.4	10.0	28.4	20.2	13.2	4.8	2.1
95.	Fajri Zafrani	174	439	15.7	8.7	8.3	30.0	22.0	13.2	3.4	2.3
96.	Fakirwala	177	482	12.6	9.5	8.7	22.5	12.5	10.1	3.8	2.5
97.	Fakir-us-Samar	178	228	9.7	8.1	7.7	36.0	23.0	5.6	3.3	2.3
98.	Fazli Mahla	181	680	17.7	10.6	10.2	25.0	13.3	10.8	4.8	2.2
99.	Fazli Zumko	182	666	15.3	10.2	9.8	23.8	10.0	11.5	4.6	2.8
100.	Fernandin	185	238	12.2	8.5	8.0	25.6	24.8	8.5	3.7	2.3
101.	George	186	425	12.9	8.8	8.3	24.6	24.2	8.5	3.8	2.2
102.	Gilli Muku	101			<i>vide</i> Bangalora						
103.	Goa	442			<i>vide</i> Totapuri Kumta						
104.	Goa Bunder	326			<i>vide</i> Pairi						
105.	Golandas	189	85	4.8	4.5	4.2	23.8	18.3	3.4	2.5	1.7
106.	Gopal Bhog	190	230	10.0	6.5	6.1	29.0	19.0	7.5	3.4	1.7
107.	Gopta	193	298	10.3	8.1	7.6	21.4	20.8	7.1	4.2	2.0
108.	Grape	326			<i>vide</i> Pairi						

# QUANTITATIVE CHARACTERS—Continued

## APPENDICES

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS				INFLORESCENCE		STONE DIMENSIONS		
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.
1	2	3	4	5	6	7	8	9	10	11	12
109.	Gulab Jaman	194	298	11.3	7.5	7.0	23.0	13.0	7.7	3.1	2.1
110.	Gulab Khas	197	255	8.5	4.4	3.9	18.0	17.0	7.5	2.9	2.3
111.	Gundu	50	978	15.0	<i>vide</i> Alphonso Bombay	10.2	34.6	25.6	11.0	4.9	2.7
112.	Hamlet	198			<i>vide</i> Malda Handle						
113.	Handle	286			<i>vide</i> Alphonso Bombay						
114.	Happus	50			10.5	9.9	29.0	23.0	11.9	4.3	2.3
115.	Hathijhul	201	482	15.8	<i>vide</i> Imam Pasand						
116.	Himayat	206			<i>vide</i> Imam Pasand						
117.	Himayudin	206			7.5	7.0	25.0	15.0	7.8	4.1	2.2
118.	Himsagar	202	340	9.5	7.0	6.5	22.0	14.0	9.5	3.4	2.0
119.	Hushnara	205	227	12.0	7.0	6.5	22.0	14.0	9.5	3.4	2.0
120.	Imam Pasand	206	517	13.1	9.6	9.1	32.4	24.5	10.1	4.4	2.3
121.	Inavat Pasand	209	352	9.7	8.2	7.9	20.0	12.5	6.2	3.3	1.8
122.	Jahanpasand	117			<i>vide</i> Bhadrul Asmar						
123.	Jailor	210	366	14.0	8.0	6.4	22.4	21.6	10.0	2.8	1.9
124.	Jali Bundha	212	439	10.6	8.8	3.4	30.0	24.0	8.5	4.7	2.5
125.	Jamadar	214	256	10.9	7.7	7.1	29.0	30.0	6.9	3.7	1.8
126.	Janardhan Pasand	217	280	10.0	7.2	6.6	27.6	18.6	8.0	3.5	2.2
127.	Janardhan Prasad	217			<i>vide</i> Janardhan Pasand						
128.	Jehangir	218	545	11.8	9.9	8.9	21.3	20.5	10.3	4.6	3.4
129.	Jehangir Chota	157			<i>vide</i> Chota Jehangir						
130.	Jhumko Fazli	182			<i>vide</i> Fazli Zumko						
131.	Johnson	221	225	9.5	7.0	6.1	28.0	18.0	7.8	3.6	3.3
132.	Kachmuha	222	199	10.3	7.7	7.3	20.0	11.3	7.5	3.0	2.0
133.	Kagdi Happus	50			<i>vide</i> Alphonso Bombay						
134.	Kaithki	225	199	9.0	5.8	5.4	26.0	13.8	7.3	3.0	2.1
135.	Kaja Laddu	317			<i>vide</i> Neelum						
136.	Kakran Jamsahab	174			<i>vide</i> Fajri Zafrani						



## QUANTITATIVE CHARACTERS—Continued

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS				INFLORESCENCE		STONE DIMENSIONS		
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.
1	2	3	4	5	6	7	8	9	10	11	12
137.	Kalapahar	226	295	9.4	7.4	6.5	28.0	18.0	9.0	4.3	2.2
138.	Kalepad	229	197	9.7	6.6	5.4	25.8	20.2	5.7	3.3	1.9
139.	Kalipari	230	797	13.3	8.3	7.8	33.0	27.0	12.4	4.7	2.4
140.	Kalamai	101									
141.	Kalapady	229			<i>vide</i> Bangalore						
142.	Kancha Mitha	233	248	10.3	7.0	6.6	23.8	13.3	8.6	3.7	2.4
143.	Kandel	234	284	10.0	7.5	7.0	32.0	17.0	8.0	2.0	2.2
144.	Karelia	237	230	16.7	6.3	6.6	30.0	18.0	13.0	3.0	2.0
145.	Karutha Kolamban	238	139	8.6	5.4	4.9	30.0	35.0	7.0	3.1	1.2
146.	Kasiru Samer	98				<i>vide</i> Bagal Sahai					
147.	Katti Neelum	317				<i>vide</i> Neelum					
148.	Kelwa Mishri	146				<i>vide</i> Buddu Ka Kelwa					
149.	Khajri	394				<i>vide</i> Samarbehist Chowsa					
150.	Khargari Bacha	241	85	6.4	4.3	3.9	27.5	15.0	3.8	2.1	1.9
151.	Khasa Ibrahimpur	242	284	9.8	6.4	6.0	18.8	11.3	7.6	3.1	1.9
152.	Khasul Khas	245	326	11.7	9.0	8.6	20.0	19.0	8.2	3.6	2.5
153.	Kheera	246	99	7.2	4.3	3.9	28.0	18.0	6.6	3.0	2.0
154.	Khorwala	82				<i>vide</i> Anokha Sarda					
155.	Khudadad	249	552	14.4	10.7	10.3	22.8	21.4	9.4	4.4	2.3
156.	Khuddus	250	182	8.2	6.5	6.1	24.5	25.4	5.3	3.3	2.0
157.	Killimuku	101				<i>vide</i> Bangalore					
158.	Kuntalyampeta	253	471	12.0	9.9	7.6	29.8	21.4	8.3	3.7	2.4
159.	Kishen Bhog	254	411	9.8	8.5	8.1	22.5	12.5	7.1	4.2	2.2
160.	Kishenbhog Bela	254				<i>vide</i> Kishen Bhog					
161.	Kohitur	257	354	10.8	8.6	8.0	31.3	21.3	10.0	4.6	2.1
162.	Kolanka Goa	258	357	11.4	9.0	6.9	24.2	23.6	7.7	3.7	2.0
163.	Kothapadi Kolamban	261	364	11.5	7.3	7.1	30.4	36.8	8.5	4.0	2.0
164.	Kothi Hyderabad	262	525	12.7	8.0	7.6	29.0	17.0	9.1	3.0	2.1

## APPENDICES

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS			INFLORESCENCE			STONE DIMENSIONS		
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.
1	2	3	4	5	6	7	8	9	10	11	12
165.	Kumarpahar	265	298	10.2	6.9	6.4	19.0	15.0	9.5	3.7	1.9
166.	Kuanpahar	266			<i>vide</i> Kuanpaharia						
167.	Kuanpaharia	266	284	10.8	6.5	5.9	27.8	20.1	9.3	3.7	1.9
168.	Lal Mulgoa	269	269	11.6	9.7	9.3	28.4	18.4	7.5	4.1	2.2
169.	Lal Pairi	270	128	8.2	6.8	6.4	18.2	17.9	6.3	3.7	2.4
170.	Langra	273	227	10.3	7.3	6.3	2.0	13.8	8.4	4.0	2.2
171.	Langra Benarsi	273			<i>vide</i> Langra						
172.	Langra Large	274	425	14.0	9.6	7.9	32.0	22.0	9.0	3.6	2.1
173.	Laskar Shikan	277	227	10.7	7.1	6.7	24.0	18.0	7.7	3.8	2.3
174.	Lat Sundari	434			<i>vide</i> Suvarnarekha						
175.	Lata	278	113	6.3	5.5	5.1	13.2	9.2	4.5	2.9	1.5
176.	Latif Aliwala	281	425	14.0	8.5	8.1	20.0	11.3	9.0	3.8	1.7
177.	Latra	282	135	6.3	6.0	5.5	32.0	22.0	4.6	3.1	1.8
178.	Lohajang	122			<i>vide</i> Bharat Bhog						
179.	Lucknow Safeda	377			<i>vide</i> Safeda Lucknow						
180.	Machli	285	340	12.6	8.8	8.1	23.8	18.8	10.5	3.4	2.0
181.	Malda	137			<i>vide</i> Bombay Green						
182.	Malda Fazli	181			<i>vide</i> Fazli Malda						
183.	Malda Handle	286	454	13.2	9.0	8.6	25.0	12.5	8.5	4.0	2.2
184.	Mali Anjoor	85			<i>vide</i> Anopan						
185.	Mandrangi	289	397	14.9	9.7	9.3	18.8	10.0	12.0	5.5	2.0
186.	Mankurad	290	227	8.5	6.8	6.3	24.2	19.1	7.0	4.2	2.3
187.	Mankova	290			<i>vide</i> Mankurad						
188.	Manoranjan	293	392	11.0	9.8	9.3	19.6	18.8	7.5	4.0	2.3
189.	Manoranjani	78			<i>vide</i> Amlet						
190.	Markeara	294	269	10.8	8.0	7.6	30.0	20.0	7.8	4.2	1.5
191.	Mewa Fajri	297	326	13.3	7.5	7.0	23.0	13.0	10.5	3.3	2.0
192.	Mahmuda	298	666	13.1	10.2	9.5	36.0	37.0	10.2	3.8	2.0

## QUANTITATIVE CHARACTERS—Continued

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS				INFLORESCENCE				STONE DIMENSIONS		
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.		
1	2	3	4	5	6	7	8	9	10	11	12		
193.	Mohambhog	301	278	11.4	9.8	9.2	18.8	11.3	8.4	5.0	2.2		
194.	Mulgoa Anar	81											
195.	Mulgoa	302	922	12.9	<i>vide</i> Anar	Mulgoa							
196.	Mulgoa Doodia	169			11.5	10.7	24.2	17.2	7.2	4.2	2.4		
197.	Mulgoa Lal	269			<i>vide</i> Doodia								
198.	Mulgoa Safed	382			<i>vide</i> Lal	Mulgoa							
199.	Mundappa	305	301	9.5	9.0	8.7	33.8	32.4	5.5	3.5	2.0		
200.	Murshidabad	306	354	12.7	8.3	7.9	26.0	26.0	10.1	4.2	2.0		
201.	Mushrad	309	255	9.5	7.7	7.3	38.0	25.0	8.0	4.4	2.6		
202.	Nadusalai	326			<i>vide</i> Pairi								
203.	Nashpati	310	128	7.2	5.9	5.7	26.0	14.2	6.4	3.7	2.0		
204.	Nastota	285			<i>vide</i> Machli								
205.	Natasalai	326			<i>vide</i> Pairi								
206.	Nazem Pasand	313	480	11.5	9.5	8.0	32.8	22.6	8.4	4.3	2.7		
207.	Nazuk Badan	314			<i>vide</i> Nazuk	Pasand							
208.	Nazuk Pasand	314	343	10.5	7.4	6.3	21.8	15.6	8.6	4.2	2.0		
209.	Nechum	317	364	11.2	8.9	8.7	26.6	21.3	6.8	4.0	2.1		
210.	Nisar Pasand	318	274	10.0	7.0	6.7	23.2	21.4	7.9	3.6	1.8		
211.	Olour	321	289	11.2	7.7	6.4	31.8	22.7	7.2	3.4	1.9		
212.	Padri	322	252	12.1	7.6	6.2	24.2	23.8	9.2	4.9	2.6		
213.	Paiposha	325	482	15.6	8.3	7.9	23.8	23.5	12.5	4.2	2.2		
214.	Pairi	326	213	10.4	8.6	8.0	24.2	23.6	6.7	3.1	2.0		
215.	Panakalu	329	189	9.4	6.9	5.9	26.3	18.7	6.4	3.4	2.4		
216.	Panchadarakalasa	330	357	10.5	8.2	7.4	23.5	24.0	7.0	4.0	2.4		
217.	Panchavarnam	333	95	6.1	5.2	5.0	23.3	17.3	5.1	4.8	1.8		
218.	Panjab Alphonso	53			<i>vide</i> Alphonso	Punjab							
219.	Panja Pasand	334	284	11.3	7.6	7.2	30.0	15.0	8.3	3.6	2.5		
220.	Pansera	337	567	14.0	8.9	8.2	25.0	23.0	10.6	3.6	2.3		

## QUANTITATIVE CHARACTERS—Continued

## APPENDICES

S. No.	Name of variety	FRUIT DIMENSIONS				INFLORESCENCE			STONE DIMENSIONS		
		Page No.	Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.
1	2	3	4	5	6	7	8	9	10	11	12
221.	Patnam Jathi	...	...	...	...	...	...	...	...	...	...
222.	Peddakalepadu	50	420	11.2	vide Alphonso	Bombay	23.4	30.2	8.1	4.0	1.8
223.	Pedda Neelum	338	657	14.4	6.7	6.1	23.4	23.8	6.8	3.2	1.9
224.	Pedda Rasam	341	489	12.2	10.3	10.1	24.2	23.8	13.3	6.2	2.2
225.	Peter	342	...	...	8.9	8.4	28.7	19.3	...	...	...
226.	Peter Pasand	326	...	...	vide Pairi	...	...	...	...	...	...
227.	Pote	326	312	10.7	8.6	8.2	23.8	23.2	6.1	3.6	2.3
228.	Prince	345	...	...	vide Amin	Tehsil	...	...	...	...	...
229.	Pulihora	77	364	10.2	7.6	7.3	32.5	33.2	6.4	3.3	2.0
230.	Puthi	346	581	14.5	13.0	12.5	24.6	24.0	6.0	2.8	1.9
231.	Rai Bhog	349	227	9.1	7.7	7.3	30.1	29.6	6.9	3.5	2.3
232.	Rajapuri	350	498	12.0	9.7	9.3	30.0	29.0	8.6	3.5	2.0
233.	Rajumanu	353	224	10.5	7.2	6.7	26.8	25.7	6.4	4.6	2.3
234.	Ram Kela	354	199	9.0	7.9	7.5	24.0	12.0	6.6	3.7	2.0
235.	Rancee Pasand	357	184	8.7	6.8	6.4	27.5	13.8	6.8	3.6	1.8
236.	Raspunia	358	113	8.4	4.0	3.6	30.0	18.0	7.4	2.2	1.7
237.	Rasputri	361	...	...	vide Pairi	...	...	...	...	...	...
238.	Rataul	326	...	...	vide Anwar	Rataul	...	...	...	...	...
239.	Reddi Pasand	362	210	7.4	7.1	6.9	23.8	15.2	6.0	3.6	2.0
240.	Rehmat Khas	365	170	9.0	6.2	5.8	21.3	12.5	7.2	3.5	1.9
241.	Roos	366	254	8.7	9.0	8.7	20.6	23.1	4.8	3.5	1.9
242.	Rose Mary	369	...	...	vide Pairi	...	...	...	...	...	...
243.	Rumani	326	245	7.1	8.0	7.9	22.5	21.8	4.6	3.2	1.8
244.	Safeda	370	...	...	vide Rajumanu	...	...	...	...	...	...
245.	Safdar Pasand	354	227	11.7	7.2	6.2	28.0	20.0	9.5	3.7	2.3
246.	Safdar Pasand Beera	373	...	...	vide Safdar Pasand	...	...	...	...	...	...
247.	Safed Mulgoa	382	383	9.5	8.7	8.1	38.0	25.0	7.6	3.1	1.9
248.	Safeda	365	...	...	vide Reddi Pasand	...	...	...	...	...	...



## QUANTITATIVE CHARACTERS—Continued

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS				INFLORESCENCE		STONE DIMENSIONS			
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.	
1	2	3	4	5	6	7	8	9	10	11	12	
249.	Safeda Calcutta	374	397	13.0	9.9	9.5	22.5	13.8	9.9	4.0	2.3	
250.	Safeda Lucknow	377	227	9.7	6.8	6.4	23.8	20.0	8.0	3.2	2.1	
251.	Safeda Malihabad	378	354	9.3	7.1	6.8	32.0	24.0	7.7	3.1	2.0	
252.	Safeda Sherbati	381	207	8.1	6.8	6.2	24.0	16.0	6.0	3.8	2.4	
253.	Sakkar China	385	156	8.9	5.9	5.4	26.0	24.0	6.8	3.1	2.0	
254.	Sakkar Gutli	386	84	7.3	6.2	5.7	22.4	21.8	6.4	3.5	1.9	
255.	Sakkar Para	386			<i>vide</i> Sakkar Gutli							
256.	Salebhoy Amidi	389	300	12.1	8.7	4.5	30.0	25.0	9.7	3.3	2.0	
257.	Salem Bangalora	390	369	10.5	10.4	7.4	22.4	21.8	7.1	3.4	1.8	
258.	Samarbehisht Alibagh	393	269	10.5	6.8	6.3	29.0	24.0	8.3	3.0	2.0	
259.	Samarbehisht Chowsa	394	298	11.4	7.6	7.1	25.0	10.0	9.1	3.7	2.2	
260.	Samarbehisht Rampur	397	368	9.6	8.0	7.6	17.5	10.0	7.5	3.6	2.3	
261.	Sangtra	398	184	8.6	6.7	6.2	20.0	12.5	8.2	3.6	2.0	
262.	Sardar	401	165	8.5	7.4	7.0	28.0	27.0	6.3	3.2	2.0	
263.	Saunfia	402	402	14.0	7.3	6.9	24.0	15.0	12.7	3.3	2.0	
264.	Schroli	405	412	11.6	7.7	7.4	23.8	13.8	8.3	4.0	1.8	
265.	Sepiya Shah Pasand	406	255	13.2	8.3	7.9	22.0	12.0	10.4	4.2	1.8	
266.	Shadulla	409			<i>vide</i> Shadwala							
267.	Shadwala	409	283	9.3	7.4	3.0	32.5	20.0	7.7	4.0	2.2	
268.	Shah Pasand	411	240	10.4	7.5	7.1	30.0	15.0	8.3	4.0	2.4	
269.	Shamsul Asmar	413	227	10.0	8.2	7.7	23.0	17.0	8.4	4.6	2.5	
270.	Shendriya	414	170	8.5	7.5	7.0	24.0	24.0	6.1	3.4	2.2	
271.	Sindhura	417	112	7.5	5.5	4.7	22.6	21.8	6.4	3.4	2.3	
272.	Sindhuria	433			<i>vide</i> Surkha Panditwala							
273.	Sobhewali Ting	418	99	7.6	4.8	4.3	22.5	12.5	6.0	2.6	1.9	
274.	Sukhtara	421	227	10.8	6.0	5.7	21.0	15.0	8.7	2.6	1.7	
275.	Sukul	422	284	12.3	7.0	6.5	20.8	13.8	10.6	3.8	1.8	
276.	Sunderprasad	425	241	10.5	7.5	7.1	21.8	12.5	9.0	3.7	2.3	

## APPENDICES

## QUANTITATIVE CHARACTERS—Continued

S. No.	Name of variety	Page No.	FRUIT DIMENSIONS			INFLORESCENCE			STONE DIMENSIONS		
			Weight of fruit in gms.	Length of fruit in cms.	Major diameter in cms.	Minor diameter in cms.	Length of inflorescence in cms.	Spread in cms.	Length of stone in cms.	Width of stone in cms.	Thickness of stone in cms.
1	2	3	4	5	6	7	8	9	10	11	12
277.	Sundersshah	...	101								
278.	Sundersshah Hyderabad	...	426	11.6	vide Bangalore 7.0	6.1	40.0	27.0	9.5	3.7	2.0
279.	Sundersshah Kumta	...	269	12.4	8.7	8.2	24.8	24.5	10.2	4.2	2.1
280.	Sundri	...	434		vide Suvarnarekha						
281.	Surkh Burma	...	430	9.4	6.6	6.1	17.0	18.0	8.8	3.6	2.2
282.	Surkha Panditwala	...	433	9.9	8.2	7.7	25.0	14.0	7.4	4.2	1.9
283.	Suvarnarekha	...	434	10.9	8.2	8.0	31.4	23.3	8.5	4.2	2.4
284.	Swarapadu	...	437	13.6	10.2	9.6	20.5	20.2	9.8	3.5	2.0
285.	Taimuria	...	438	10.5	6.6	6.1	19.0	18.0	8.5	2.8	2.1
286.	Tenneru	...	441	1698	13.8	11.5	28.6	21.3	13.5	5.0	2.3
287.	Thevadiyamuthi	...	101		vide Bangalore						
288.	Totapuri	...	101		vide Bangalore						
289.	Totapuri Kumta	...	503	11.8	8.8	7.7	23.3	18.1	8.3	4.2	2.0
290.	Totapuri Ratnagiri	...	567	13.0	10.0	9.5	23.8	23.2	8.3	4.3	2.1
291.	Totapuri Small Red	...	99	8.3	5.5	4.7	25.0	18.0	6.8	2.6	1.7
292.	Umdra	...	218		vide Jehangir						
293.	Vanraj	...	400	11.1	8.5	8.1	29.0	28.0	9.5	4.5	1.8
294.	Vellai Kolamban	...	127	9.2	5.2	4.7	40.0	42.0	7.0	2.8	1.0
295.	White Alphonso	...	54		vide Alphonso	White					
296.	Willard	...	109	6.9	5.9	5.1	30.0	35.0	5.0	2.8	1.6
297.	Yukutia	...	205		vide Hushnara						
298.	Yerra Goa	...	326		vide Pairi						
299.	Yerra Mulgoa	...	392	9.3	8.3	8.1	22.8	16.6	7.4	3.9	2.3
300.	Zafran	...	113	10.2	7.0	6.4	27.0	18.0	8.4	3.3	2.1
301.	Zardalu	...	199	11.6	6.7	6.2	27.5	12.5	8.5	3.5	2.1
302.	Zumko Fazli	...	182		vide Fazli Zumko						

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## INDEX TO SUBJECTS

- Acreage under mango, 463  
Air layering, 474  
Alternate bearing, 488
- Botany of mango, 13-17  
Bud differentiation, 487  
Budding, methods of, 471-73
- Chappar*, mango tree, 3  
Classification and nomenclature, 7-11  
Climate, for mango culture, 465-66  
Commercial cultivation, 465  
Commercial varieties, a table of, 505-6  
Cultivation, 463-90  
Cultural practices, 479-83  
Cytogenetics, 15-17
- Diseases, 498-502
- Floral characters, 25-26  
Flowering and flushes, 487  
Frost, protection against, 482  
Fruit characters, 27-37
- Grading, need for, 485  
Grafting, 473-74  
Grouping of varieties, 10
- Harvest, 483-85  
Hormones, effect on rooting, 474
- Inarching, 467-71  
Insect pests, 491-98
- Intercropping in mango orchards, 480-81  
Irregular bearing, 485-90  
Irrigation, 480
- Mango, antiquity of cultivation in India, 3-7; botany of, 13-17; cultivation practices of, 463-90; area under, 19, 463; historical gardens of, 3, 4, 7, 378; importance of in Indian life and culture, 3-7; pest and diseases of, 491-502; species of, 7, 15; varieties of, 38-459  
Manuring, 481-83  
Marketing of mangoes, 484  
Morphological characters, description of, 19-37, 38-459
- Origin and history of mango, 3-7
- Planting of mango, 477-79  
Propagation of mango, 466-77
- Quantitative characters, 507-17
- Seed, germination of, 467  
Seedlings, raising of, 466-68  
Soil, 466  
Specimens, selection of, 21-25
- Top working, 476-77
- Varieties, *see* INDEX TO VARIETIES
- Windbreaks in orchards, 477-78
- Yields, 3, 483



## INDEX TO MANGO VARIETIES

- Abe-Hayat, 38  
 Alipasand, 41  
 All-the-Year-Round, *see* Baramasia  
 Allumpur Baneshan, 42, 477  
 Alphonso, 10, 16, 214, 326  
 Alphonso Batli, 45  
 Alphonso Bihar, 46  
 Alphonso Black, 49  
 Alphonso Bombay, 50, 214  
 Alphonso Punjab, 53  
 Alphonso White, 54  
 Aman Abbasi, 57  
 Aman Angoori, 58  
 Ambalavi, 61  
 Amin Abdul Ahed Khan, 62  
 Amin Heera, 65  
 Amini, 66  
 Amin Ibrahimpur, 69  
 Amin Khurd, 70  
 Amin Mohammad Yunus Khan, 73  
 Amin Sahai, 74  
 Amin Tehsil, 77  
 Amlet, 78  
 Anar Mulgoa, 81  
 Annas Fatepuri, *see* Markeera  
 Anokha Sarda, 82  
 Anopan, 85  
 Anora, 86  
 Anwar Rataul, *see* Rataul  
 Appas, *see* Alphonso Bombay  
 Ashruf-us-Samar, 89  
 Asojia, 90  
 Athimadthuram, 93  
 Aziz Pasand, 94  
 Azum-us-Samar, 97  
  
 Badami, *see* Alphonso Bombay  
 Badsha Pasand, *see* Safeda Lucknow  
 Badrul Asmar, 117  
 Bagal Sahai, 98  
 Baneshan, 102  
 Bangalora, 8, 101  
 Bangalawala, *see* Shamsul-Asamar  
 Banganpalli, 102, 477  
 Banka, 105  
 Bansod, 106  
 Baramasia, 109  
 Begum Pasand, 110  
 Belkhas, 113  
  
 Benazir Sandilla, 114  
 Bhaduriya, 118  
 Bharat Bhog, 122  
 Bhawani Chowras, 121  
 Bhopli, 125  
 Bili Ishada, *see* Alphonso White  
 Black Andrews, 126  
 Bobbili Pedda Kayalu Punasa, *see* Kintal-  
     vanipeta  
 Bobbili Punasa, *see* Kintalvanipeta  
 Bombai, 129  
 Bombai Abdul Huq, 130  
 Bombay Bhutto, 133  
 Bombay Darsha, 134  
 Bombay Green, 137, 138, 286, 405  
 Bomay Yellow, 138  
 Borsha Kalamsar, 141  
 Bride of Russia, *see* Surkh Burma  
 Brindabani, 142  
 Buddipasand, 145  
 Buddu Ka Kelwa, 146  
  
 Chambatan, 149  
 Chandrakaran, 150  
 Chaptai, *see* Banganpalli  
 Chaptai, *see* Banganpalli  
 Cherukrasam, 153  
 Chinnarasam, 154  
 Chinnasuvananarekha, *see* Suvaranarekha  
 Chota Jehangir, 157  
 Collector, *see* Bangalora  
 Colour, *see* Pulihora  
 Cowasji Patel, 158  
  
 Dadamiyo, 161  
 Dandiwali Amin, *see* Amin Abdul Ahed  
     Khan  
 Dilpasand, 165  
 Dondakayalumanu, 166  
 Doodia, 169  
 Dophool, 170  
 Dusehri, 9, 16, 474  
 Dusheri Aman, 162  
  
 Fajri, 173, 394  
 Fajri Zafrani, 174  
 Fakirwala, 177  
 Fakr-us-Samar, 178  
 Fazli Malda, 181

## THE MANGO

- Fazli Zumko, 182  
 Fernandin, 185
- George, 186  
 Gilli Mukku, *see* Bangalora  
 Goa, *see* Totapuri Kumta  
 Goha Bunder, *see* Pairi  
 Golandas, 189  
 Gopal Bhog, 190  
 Gupta, 193  
 Grape, *see* Pairi  
 Gulab Jaman, 194  
 Gulab Khas, 197  
 Gundu, *see* Alphonso Bombay
- Hamlet, 78, 198  
 Haphus, 50  
 Hathijhul, 201  
 Himsagar, 202  
 Hushnara, 205
- Imam Pasand, 42, 206  
 Inayat Pasand, 209  
 Irulappan Bangalora, *see* Salem Bangalora
- Jahanpasand, *see* Badrul Asmar  
 Jailor, 210  
 Jali Bundha, 213  
 Jamadar, 214  
 Janardhan Pasand, 217  
 Jehangir, 218  
 Johnson, 221
- Kachmuha, 222  
 Kagdi Happus, *see* Alphonso Bombay  
 Kaithki, 225  
 Kaja Laddu, *see* Neelum  
 Kajri, *see* Samarbehisht Chowsa  
 Kakran Jan Saheb, *see* Fajri Zafrani  
 Kalapahar, 16, 226  
 Kalepad, 229  
 Kalipari, 230  
 Kallamai, *see* Bangalora  
 Kallapady, *see* Kalepad  
 Kancha Mitha, 233  
 Kandel, 234  
 Karelia, 237  
 Karutha Kolamban, 238  
 Katti Neelum, *see* Kalepad  
 Kelwa Mishri, *see* Buddu Ka Kelwa  
 Khader, *see* Alphonso Bombay  
 Kiajri, *see* Samarbehisht Chawsa  
 Khangari Bacha, 241  
 Khasa Ibrahimpur, 242
- Khas-ul-khas, 245  
 Kheera, 246  
 Khorwala, *see* Anokha Sarda  
 Khudadad, 249  
 Khuddus, 250  
 Killi Mukku, *see* Bangalora  
 Kintalvanipeta, 253  
 Kishen Bhog, 254  
 Kohinoor, *see* Amin Abdul Ahed Khan  
 Kohitoor, 257  
 Kolanka Gova, 258  
 Kothapalli Kobbari, 261  
 Kothi Hyderabad, 262  
 Kumarpahar, 265  
 Kuanpaharia, 266
- Lal Mulgoa, 269  
 Lal Pairi, 270  
 Langra, 9, 273, 474  
 Langra Large, 274  
 Lashkarshikan, 277  
 Lata, 278  
 Lat Sundri, *see* Suvarnarekha  
 Lateef Aliwala, 281  
 Latra, 16, 282  
 Loha Jung, *see* Bharat Bhog
- Machli, 285  
 Mahmuda, 298  
 Malda, *see* Bombai  
 Malda Handle, 286  
 Maldah, *see* Sheroli  
 Mandragi, 289  
 Mankurad, 290  
 Manoranjan, 293  
 Manoranjani, *see* Amlet  
 Markeara, 294  
 Mewa Fajri, 297  
 Mohanbhog, 301  
 Mulgoa, 302  
 Mulgoba, 10  
 Mundappa, 305  
 Murshidabad, 306  
 Mushrad, 309
- Nadusalai, *see* Pairi  
 Nashpati, 310  
 Nastota, 285  
 Natasalai, *see* Pairi  
 Nazeemkhanpasand, *see* Nazeem Pasand  
 Nazeem Pasand, 313  
 Nazuk Badan, *see* Nazuk Pasand  
 Nazuk Pasand, 314

## INDEX TO MANGO VARIETIES \*

Neelum, 317, 477  
Nisar Pasand, 318

Olour, 321

Padiri, 322

Paiposha, 325

Pairi, 326

Panakalu, 329

Panchadarakalasa, 330

Panchvarnam, 333

Panja Pasand, 334

Pansera, 337

Patnam Jathi, *see* Alphonso Bombay

Peddakalepadu, 338

Pedda Neelum, 341

Pedda Rasam, 342

Peter, *see* Pairi

Pote, 345

Prince, *see* Amin Tehsil

Pulihora, 346

Puthi, 349

Rai Bhog, 350

Rajapuri, 353

Rajumanu, 354

Ram Kela, 357

Ranee Pasand, 358

Raspunia, 361

Raspuri, *see* Pairi

Rataul, 362

Reddi Pasand, 365

Rehmat Khas, 366

Roos, 369

Rumani, 370

Safdar Pasand, 16, 373

Safeda, *see* Rajmanu, Banganpalli and other

Safeda Varieties

Safeda Calcutta, 374

Safeda Lucknow, 377

Safeda Malihabad, 378

Safeda Sherbati, 381

Safeda Mulgoa, 382

Sakkar China, 385

Sakkar Gutli, 386

Sakkar Para, *see* Sakkar Gutli

Salebhoy Amidi, 389

Salem Bangalora, 390

Samarbehisht Alibagh, 393

Samarbehisht Chowsa, 394

Samarbehisht Rampur, 397

Sangtra, 398

Sardar, 401

Saunfia, 402

Sehroli, 405

Sepiya Shah Pasand, 406

Shadwala, 409

Shah Pasand, 410

Shamsul-Asmar, 413

Shendriya, 414

Sindhura, 417, 433

Sobewali Ting, 418

Sukh Tara, 421

Sukul, 422

Sunderprasad, 425

Sundersha Hyderabad, 426

Sundersha Kumta, 429

Surkh Burma, 430

Surkha Panditwala, 433

Suvarnarekha, 434

Swárapadu, 437

Taimuria, 438

Tenneru, 441

Thevadiyamuthi, *see* Bangalora

Totapuri, *see* Bangalora

Totapuri Kumta, 442

Totapuri Ratnagiri, 445

Totapuri Small Red, 446

Umdra, *see* Jehangir

Van Raj, 449

Vellai Kolamban, 450

Willard, 453

Yakutia, *see* Hushnara

Yerra Goa, *see* Pairi

Yerra Mulgoa, 454

Zafran, 457

Zardalu, 458







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